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Battelle Technical Review

IN THIS ISSUE:

Fluidized Beds in Extractive Metallurgy

SPIRIT OF SCIENCE —HOPE OF MANKIND

"While arts and ethics are in upheaval, science alone marches on. Have I found the answer to the great quest which has taken me out of an old-fashioned Medieval World of the East and catapulted me across half the globe to this land—the answer to the key truth I sought? I feel that in working humbly, as a sort of wandering friar, as a disseminator of the *spirit of science* even more than as a disseminator of science information, I may have found at least the beginning of a new hope for mankind, a new hope for peaceful unity and for the progress of all varieties of human beings.

Gobind Behari Lal, noted science writer

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BATTELLE TECHNICAL REVIEW

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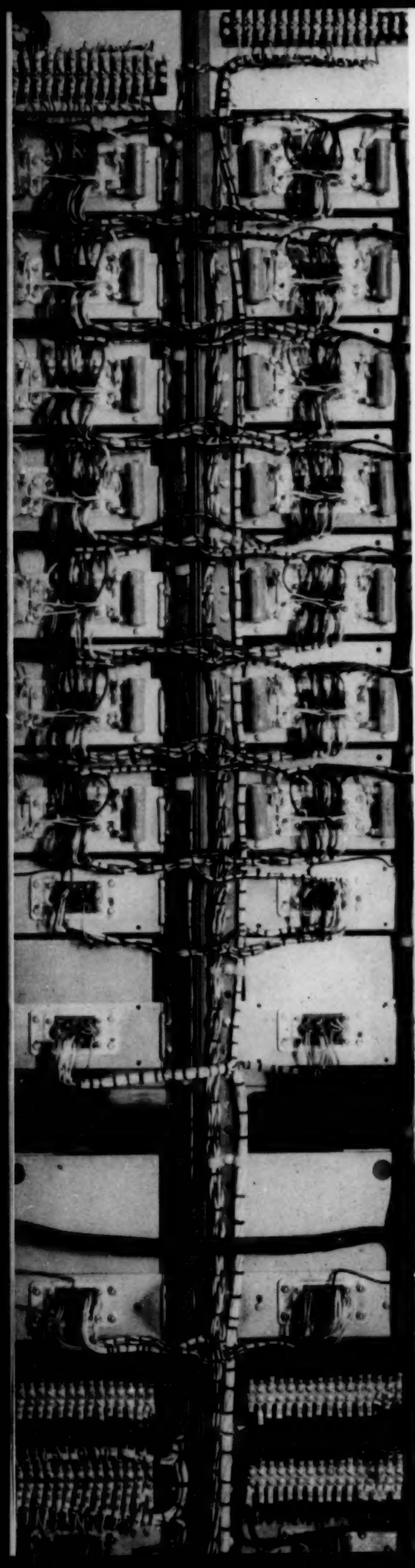

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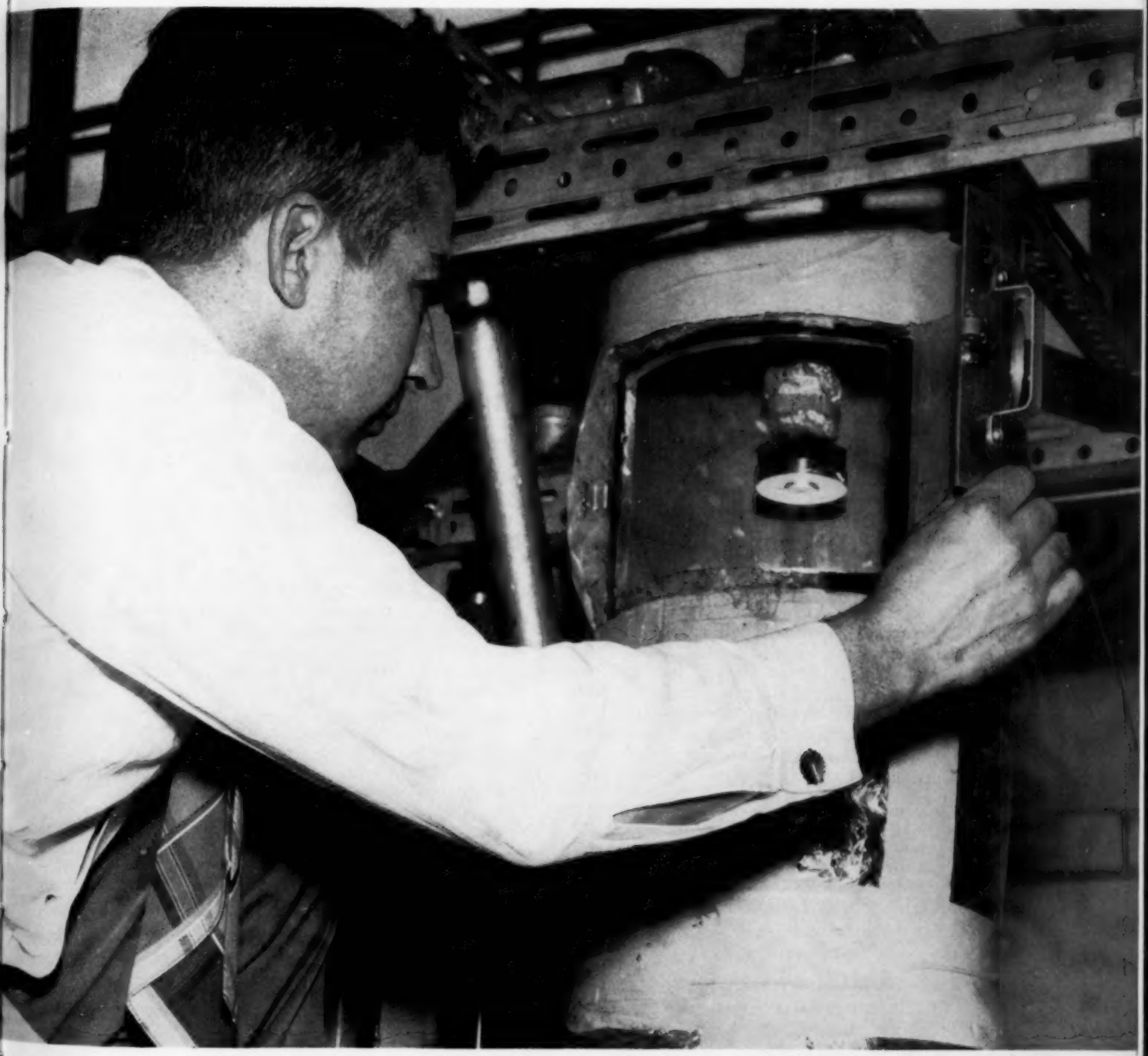
Spinning equipment is important in studies of the fiber-forming properties of synthetic polymers. The spinnerette, through which experimental polymers are forced to form fibers, is being inspected here prior to a laboratory run. Polymers are forced through the 10-micron-diameter orifices of the dry-spinning apparatus at a pressure of 500 pounds per square inch. The extruded filaments then pass through a vertical hollow column filled with warm air, where they harden, and are wound on a reel.



EXPERIMENTAL SPINNER

VIGNETTE

COATINGS CHEMIST

ERNEST R. MUELLER

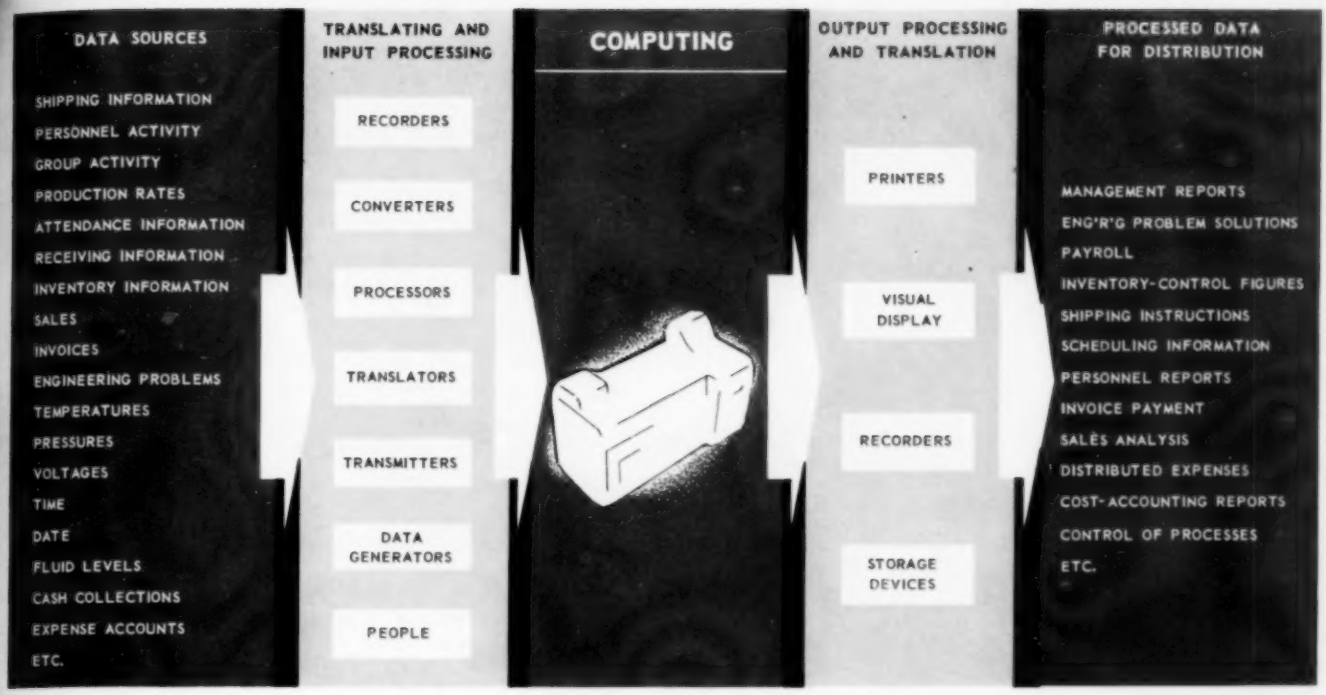
The technological problems of the coatings industry have long been the focus of Ernest R. Mueller's research activities. In view of this interest and the contributions that he has made in the field, it is not strange that Ernie has been chosen to serve as chairman of the Organic Coatings Conference this summer at New Hampton, New Hampshire. This is one of the 1958 series of the famed Gordon Conferences.

One area of research which has engaged much of Ernie's attention has been the study of coatings, raw materials, and chemical intermediates. In these studies he has been concerned with such materials as new diabasic acids and polyhydric alcohols and oils for the creation of new resins. He has participated in utilization studies of petroleum products, including new hydrocarbon resins in coatings. The improvement of tall oil as a coating material and problems connected with paint drying have engaged much of his attention. Ernie has been associated also with the development of carbon film resistors, special coatings for printed circuits, coatings for improved electrical insulation, moisture- and solvent-resistant coatings, and special adhesives. One of his current interests is the study of water-thinable coatings for use where such coatings have not previously appeared feasible.

Ernie received a B.S. degree from Michigan State University, and an M.S. degree from Purdue University. His interest in the chemistry of coatings stems from an early association with the Ditzler Color Division of the Pittsburgh Plate Glass Company. There, he was first in charge of the analytical control laboratory and later, as a chemist, directed phases of new-product research.

Author of numerous papers, Ernie shared, as coauthor, the 1955 Carbide and Carbon Award of the Paint, Plastics, and Printing Ink Division of the American Chemical Society. The paper "Effect of Driers on Linseed Oil and Varnish Films—A Chemical and Infrared Study", was selected to receive the award for its scientific value and excellence of presentation. His professional activities include the Secretary-Treasurership of the Paint, Plastics, and Printing Ink Division of ACS, which he holds for the second year. He is also an active member of the Federation of Paint and Varnish Production Clubs and of the American Oil Chemists Society.

Ernie and his wife, Mary, have two children—a daughter 15 and a son 11. Ernie relaxes with golf, fishing, and gardening, and enjoys with his wife a mutual interest in dancing—ballroom and square.



Communicating With Computers

Good communication with computer systems calls for auxiliary equipment to process data both into and out of the computer (see above). The author describes the types of equipment available and discusses the importance of proper selection to enable a system to accomplish its assigned tasks.

by George H. Jenkinson

In Recent years, much has been written about analog and digital computers or "electronic brains" as they are sometimes called. The growth of the industry producing these machines has been spectacular. They have attracted much attention among American scientists and businessmen and have aroused also the interest of the general public. However, an equally amazing series of related developments has gone almost unrecognized. These have resulted in the numerous electronic, mechanical, and electromechanical devices that have become necessary to obtain and process the information which is used by computers. Some of these devices take data from all manner of sources and convert them into language the computer can understand and accept. Others take the output of the computer and convert it into language that people can understand and use.

The tremendous growth in the number and types of available auxiliary equipment deserves notice, particularly because of its importance in the computer picture. As will be seen, the computer itself is only the beginning of a computing system. To carry on desired operations each system requires auxiliary equipment of varying types. And to round out the picture, the importance (and problems) of housing and manning such a system must also be considered.

Everyone is familiar with the age-old expression "necessity is the mother of invention", and it would be very difficult to imagine any field where this is more evident than in the evolution of today's auxiliary

devices for computers. It would be an oversimplification to say that development of these devices has been the outgrowth of computer developments alone. The fact is, new developments of either computers or their auxiliary devices often create the necessity for further developments (or inventions) in the other field. Because of the emphasis upon speed of processing of information, each technological advance in one area calls for corresponding advances in the other in order to make possible the utilization of the ever-increasing capacity.

Development of Auxiliary Devices

It is difficult to realize that the bulk of this equipment has been developed since about 1940, much of it being more or less direct results of electronic discoveries during World War II. Never before has such a vast industry developed so quickly, and of course the end is by no means in sight. The far-reaching effects of pioneering research into the electronic unknown has contributed strongly to these developments.

This entire auxiliary-equipment industry is built on the foundation of civilized man's need to communicate. Ultimately the degree of success of a person, a company, an industry, or even an entire nation is determined largely by the effectiveness of its communications, both internal and external. A company that installs an efficient information-processing system gains an advantage over its competitors. To keep pace, others in the industry must install corresponding improvements in their information systems. And so it goes: each improvement calls for further improvements, with the present boom in developments being the natural outgrowth of this condition.

Utilization of Developments

Many a company has discovered, much to its ultimate financial regret, that a newly acquired computer seemingly did not understand the language used by the organization. Although it may seem ridiculous to speak of a machine "not understanding", this is exactly what happens occasionally. Components of an information-processing system must be carefully selected to provide adequate compatibility of the computer, procedures, information, people, and physical plant facilities. Otherwise, there is a very good chance that the system will not be successful in fulfilling its intended purpose.

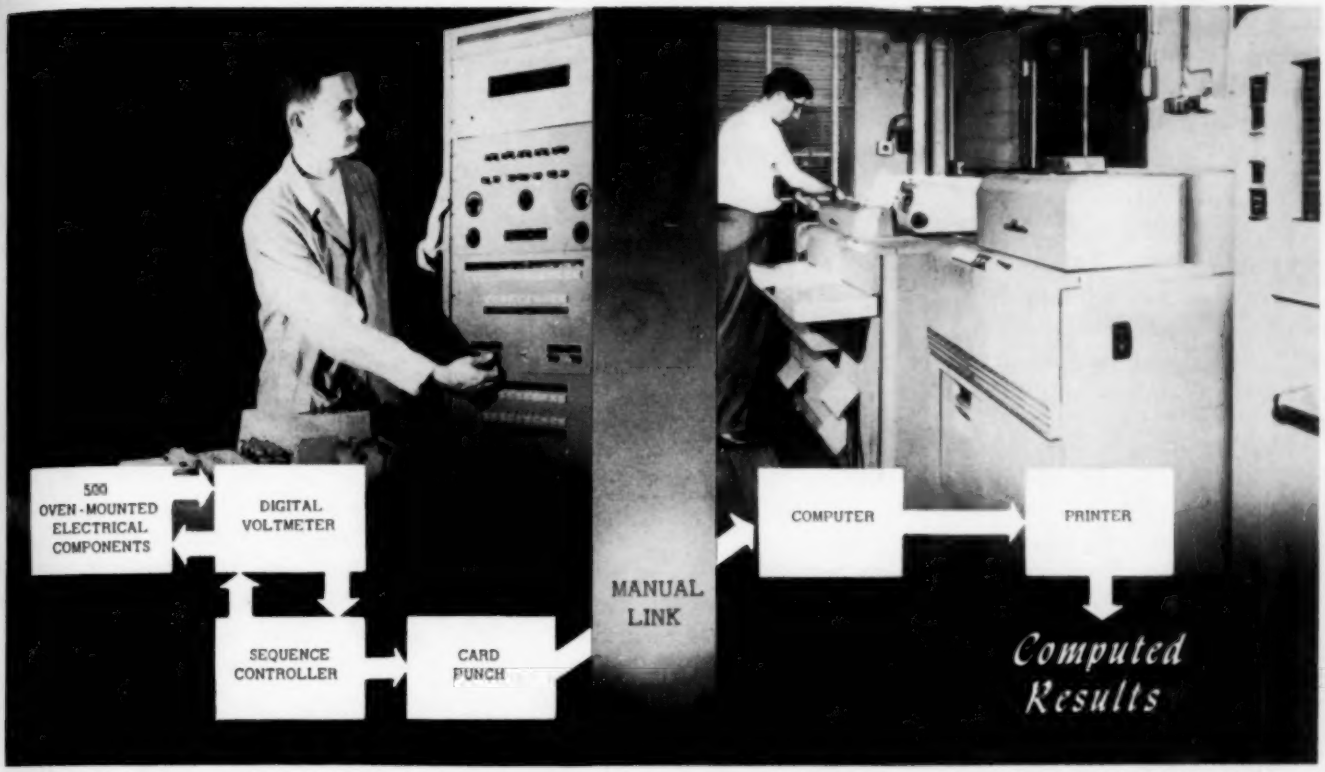
For the purpose of illustration, consider the situation in which a company apparently has a need for a technical specialist. Let us assume that the only source of competent men in this field is a small group of Greek mathematicians speaking various dialects. The first question the company must ask is: Do we need such a mathematician? Because many of this company's competitors have already hired specialists and found them useful, responsible executives decide such a mathematician is urgently needed. Other questions must then be answered. Which one should be employed? Which speaks the dialect that best fits the information to be dealt with? Who is going to be the interpreter? In other words, exactly what alterations are necessary to integrate this highly desirable specialist into the company's operations?

The Greek mathematician may be compared with an electronic computer that a company acquires to meet a specific need. The computer, like the mathematician, will require "auxiliary equipment" to fit it into the organization so that the greatest possible benefit will be derived from its use.

Data-Collection Devices

The collection of information is a prime function in any computing system. In fact, the computer exists only as a tool for rapid processing of information which has already been obtained. The information must be detected, converted into machine language, recorded, processed, translated, and since it is normally collected at a source remote from the computer, it must be transported or transmitted. Also, on some occasions, data such as random numbers must be generated to fill a computing need. The following paragraphs will describe the various existing types of data-collecting devices and show how they contribute to the smoothness of the flow of information in the

George Jenkinson has been working with computers and related equipment for more than a decade. At Battelle he has been concerned with a variety of developments in data computing systems, including the automatic recording and analysis of data from electronic components under evaluation and the development of auxiliary equipment for use in highway plotting and design. He has also contributed to the design of "logic" circuitry and special office accounting equipment and has participated in studies to determine special needs for computer facilities. Prior to his association with Battelle, George served with International Business Machines Corporation's computer field services.



Auxiliary equipment allows computer processing of data from unusual sources. This diagram illustrates how 500 electrical components mounted in an oven can be automatically checked at predetermined periods. The sequencing programmer and digital voltmeter on the left permit direct recording of data on punched cards for later machine computation. The results are processed by the computing equipment shown on the right, for later evaluation by technologists.

system. The fact that overlaps and apparent misfits occur is acknowledged, and the reader may feel free to consider that a particular device might better be classified otherwise.

Data Converters accept information destined for the computer (such as quantities, measurements, time recordings, identifications, etc.) and translate it into electrical impulses, holes in paper tape or cards, or other forms required for the particular computer. Examples: *analog-to-digital converters, digital-to-analog converters, paper-tape punches,* and *card punches.*

Recorders, as the term implies, record measurements, occurrence of events, time, etc., directly in computer language, or in a form readily convertible to computer language. They provide temporary or permanent storage of information which is available to the computer when required. Examples: *time recorders (special clocks), data curve plotters, tapes (magnetic, punched, printed, etc.),* and *counters.*

Data Processors accept recorded raw data and prepare it for use by the computer. This might involve sorting, summing, collating, verifying, tabulating, converting, etc., depending upon the type of computer and the application. The machines required for this processing are indispensable and must be carefully selected in order to assure efficient computer systems operation. Examples: *sorters, collators, tabulators,* and *reproducers.*

Translators take recorded data in a form which is not directly suitable for the processing equipment or the computer and translate or convert them into a desired form. This might occur, for example, when processing data are recorded as curves. In this case, a curve reader would be employed in order to produce data on punched tape or cards. This type of device would also be required in processing the same information on two different types of computers where the output from one computer would have to be translated before it could be used in the other. Examples: *curve-reading devices* and *decimal-to-binary-number translators (and vice versa).*

Transmitters may be said to be merely additional types of processing devices, and this is probably true. Nevertheless, it is felt that they should be listed separately since data-transmission systems generally are optional rather than essential. At any rate, data transmitters serve the purpose of projecting data to another location, either within or between plants. Such

devices make it possible to collect data from many places and process them at a central location for efficiency. Examples: *punched tape, punched card, magnetic tape (which may be transmitted by telephone, telegraph, or radio),* and *television monitors.*

Data Generators are sometimes necessary to generate special data, such as mathematical functions or random numbers. This need has called for another category of special equipment and, as usual, the equipment manufacturers have brought forth a series of devices. Examples: *random-number devices, time-function generators,* and *noise generators.*

Data-Distribution Devices

After the computer has completed its task of processing the collected information, it becomes necessary to distribute the results to those places where they are needed. There are many methods for distribution. The most common one is the printed report or tabulated sheet. Other methods depend upon the kind of information involved, how much of it there is, and by whom it will be used or what type of equipment will be used. The types of devices include printers, visual displays, recorders, and storage devices, and are described in the following paragraphs.

Printers, as output devices for computers, are of a more obvious utility than other data-distribution devices, and there is little need to point out their importance. They are the usual means by which the computer communicates directly and immediately with its operator. However, as the speed of computers has increased, the variety and speed of printers has also increased. There are many types from which to choose and, again, the choice is very important to the system in order to assure compatability. Examples: *electromechanical (type-bar, type-wheel, etc.),* wire matrix, and *electrographic.*

Visual Displays provide visual access to intermediate data for the purpose of monitoring the computer process. These are the fascinating blinking lights one sees on computer consoles which indicate a flurry of activity within. However, in addition to the displays at the console, and particularly in the case of machines which do not provide such a display, other outlets for this information are sometimes desirable. For example, the stock exchanges, if utilizing a computer system, could automatically display transactions simultaneously at several remote locations. For such special cases, read-out devices are available. A few visual displays are: *lighted numerals, light matrixes, radar-type maps, mechanical registers,* and *beam-writing (T.V. type) tubes.*

Recorders, previously mentioned as data-collection devices, may also be used as distribution media. Many times the same recorder, or at least the same type of recorder, can be used both in the input and output areas of the system if the proper coordination of equipment allows. Typical data-distribution recorders are: *data-curve plotters, tape (magnetic, punched, printed, etc.),* and *card punches.*

Storage Devices for distribution purposes refer to those into which information from a computer may be rapidly deposited for future printing or punching. Such devices are used so that the computer need not be stopped or appreciably slowed down during this data-distribution operation. Other storage devices have been developed to replace card files (such as inventory cards) in order to maintain a more accessible and readily updated system. Examples: *magnetic drums and discs, tapes (magnetic, punched, printed, etc.), magnetic cores,* and *television-type storage tubes.*

It is evident from the preceding paragraphs that the number of devices eventually falling into these classifications is considerable. There are certainly several hundreds of varieties; perhaps even thousands, and the task of reaching a decision as to which particular piece of equipment is best suited to a given function is, at best, very difficult. Actually, this situation promises to become more difficult with the passage of time, as the addition of new pieces of equipment seems to be limited only by the imaginations of systems designers in finding new areas where auxiliary equipment can satisfy a systems requirement.

Additional Auxiliary Requirements

Continuing the discussion of the auxiliary requirements of the computing system "as a whole", two additional factors must be considered. Both adequate physical facilities and properly trained personnel are important factors in the efficient operation of a computing system.

Physical Facilities

It is necessary to plan the computing system completely. One of the most important considerations, sometimes unanticipated, is that of the physical facilities required. The importance of this factor is emphasized by the fact that many manufacturers will not deliver their computers until the proper environment for it has been prepared. The equipment required for communicating with the computer must be either located in, or excluded from the computer area as the

case may be, and space requirements will depend upon this decision. Thus, physical facilities, to be adequate, must properly house the entire system, with enough room to permit a reasonable amount of expansion.

The facilities required will vary considerably with the kinds of computer involved. Physical arrangements may call for air-conditioning, humidity control, dust control, regulated electrical power, false floor paneling and, of course, considerable space. The cost of designing and installing all these alterations runs up to a sizeable percentage of the cost of the complete computer installation. Such costs are definitely too large to ignore.

People

Perhaps it is indelicate to consider people as auxiliary equipment, but in a computing system they are just that. A computer is like a thoroughbred horse; they both require special handling by carefully trained people if they are to be more than impressive showpieces.

Normally, organizations have two primary sources of supply of people who may operate computers. The employees who are already part of the organization and familiar with the company's present operations comprise the first source. These people may be trained in operation of the computer (and the auxiliary devices). The second group is made up of people who have training and experience in the use of the new computing system. They must be found and hired. In many instances, these people will be the ones who instruct the first group, and therefore they must be highly qualified. As with the physical-facility factors, this problem of training and hiring is a very important consideration in the success or failure of the complete system.

Some Unusual Auxiliary Equipment

Some idea of the variety of uses to which computers may be put, when proper auxiliary equipment is available, may be gained from examples of such uses. As is so often the case, much of the more advanced work in the development of new areas for use has been stimulated by the Armed Forces. One of the most interesting applications of the computer as developed by the military is described below.

Perhaps one of the most important present-day uses of computers is in "real-time operation". The term "real time" means that the computer operates so quickly that present information is processed continuously to give continuous and instantaneous solutions to the problem involved.

A current example which illustrates this principle of operation is the inertial guidance system of a missile. The guidance of a missile in flight requires constant checking and correction. Inertial guidance is the most effective system now available. To make this possible, the builders have created a 'stable platform" which remains fixed with respect to its position at the time of firing. The platform, which was created by attaching a small frame to gyroscopes, holds its original position regardless of the rotation or angle of elevation of the missile.

Between the gyroscopes and the frame of the missile are sensing devices which produce electrical signals corresponding to the difference in position between the stable platform and the missile frame. The electrical signals from these sensing devices are that part of the information which is entered into the missile's computer to tell when it is off its course. The information as to what the course should be at a particular time, is entered directly into the computer from a preset program determined by the flight path desired.

The term "real-time computing" in this instance means that the missile's computer instructs the missile guidance system to deviate a certain amount from the position of the "stable platform". Then, it checks to see that this position is reached. If the proper position has not been reached, the different signals from the gyroscope sensing devices tell the computer what corrections to make. Being electronic, these instructions are almost instantaneous and are constantly controlling the missile's flight path.

An interesting nonmilitary application uses a computing system to control automatic mixing or weighing machines. In this case, the computer is instructed to allocate certain amounts of each of several materials to make up a batch of a certain substance. The computer controls (in "real time") the operation of the selection devices and is informed from the auxiliary equipment when the proper amount of each material has been apportioned. In this case, the auxiliary equipment would be weighing mechanisms, color sensing devices, counters, thermometers, etc., as required to provide the computer with information about the mixing process.

Another nonmilitary application, and one which is familiar to many people, is the traffic-light control system. In a system of this type, there is a relatively simple computer which controls the traffic at an intersection. The length of time that lights permit traffic to move in a given lane is determined by the information from the traffic counting devices in that lane. In this instance, the counting devices constitute the auxiliary data collection equipment. If the intersection is made up of more than four streets, or if an unusually

large number of cars turn left, the computer becomes more complex, and requires more information from the traffic counters.

There are, of course, many more very interesting systems with computers providing the logic, and the auxiliary equipment providing the communication link.

Conclusions

As suggested by the preceding paragraphs, auxiliary data collection and distribution devices satisfy a long list of special functional requirements. Some of these devices are indispensable. Others have somewhat diminishing degrees of necessity. In fact, in some systems, certain of these devices are quite unnecessary and their use can cause the cost of the system to become prohibitive. On the other hand, there are times when a bottleneck in the information flow of a system can be opened quite effectively by installing a special device in the key spot. People experienced in computer operation know that computers and auxiliary equipment must be understood and selected according to a realistic and objective plan. Each device—and the system collectively—must speak the same language as the computer to provide smooth communication.

Developments to date in this field of auxiliary devices for computers have brought astounding progress. Yet the very progress itself has led to considerable confusion in the process of selecting the best piece of equipment for a given function in a particular system. This confusion is not limited to users. Even manufacturers have difficulty deciding which pieces of equipment to include in their line of products. The consequences, as one might expect, lead to considerable differences of opinion as to what systems should be recommended to perform a given function. Recommendations of components may need to be based upon a complete knowledge of all existing equipment available rather than upon a knowledge of a particular manufacturer's equipment.

Because of the uncertainties as well as the costs involved, companies would do well to canvass the situation before proceeding with such a costly installation. An objective study should include these important points: (1) a careful evaluation of the tasks which the computing system may be expected to carry out; (2) a study of the types and forms of information to be handled; (3) selection of equipment that will most effectively handle the information and perform the desired tasks; (4) determination of the cost of the installation and operation of the equipment; and (5) last, but not least, compare this cost with the costs of other possible methods of doing the same job. Such an evaluation may be performed by either a specially organized group within the company or by some outside organization which is informed on developments and able to give objective recommendations.

"It seems to me that the political education of scientists . . . can be accomplished primarily through training in the humanities . . . The scientist must learn that men do not behave reasonably, but in accordance with the patterns of their culture, that the human mind is not a logical machine . . .

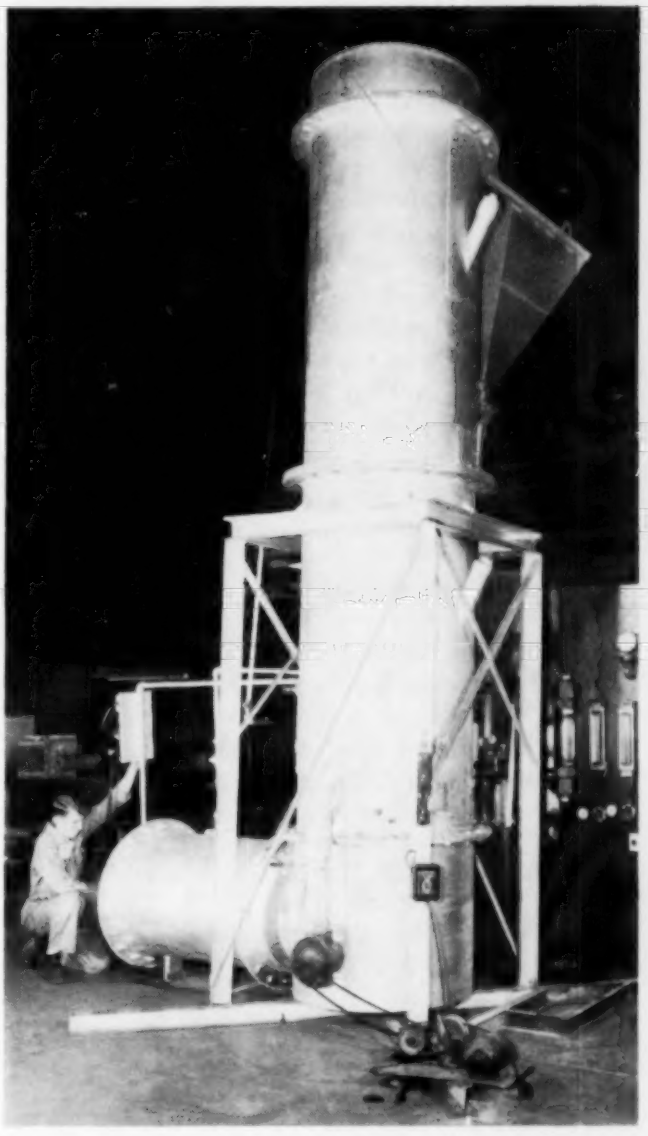
"In carrying out their political tasks, scientists need also a breadth of knowledge of science itself. One essential part of the political education of scientists must therefore be to avoid a too narrow specialization . . . As for the scientific education of the politician, I feel myself on less certain ground . . . It is . . . important, it seems to me, to teach the future politician something of the nature of scientific discovery, the difficulty of finding out the truth, the objectivity, imagination, and selflessness that are required, the fact that major discoveries always lie close to the frontier of science and not far beyond it . . . "

Dr. Roger Revelle
Scripps Institution of Oceanography

Fluidized Beds in Extractive Metallurgy

by L. Wallace Coffer
and Frank M. Stephens, Jr.

The fluidized bed has proved effective in a variety of extractive-metallurgy processes. The authors discuss the factors involved in successful fluidized-bed operation and suggest additional areas where the equipment may be effectively utilized.



A two-foot-diameter, double-hearth experimental fluidized-bed reactor. It has been used in studies on such fluidized-bed extractive-metallurgy processes as sulfate roasting of sulfide flotation concentrates, reduction roasting of iron oxides, and thermal drying.

Extractive metallurgy, as an art, was known before the beginning of recorded history. As a science, it is still in its infancy. In the meantime, chemistry, which had its beginnings in extractive metallurgy, has grown into one of our best-known sciences. Extractive metallurgy, on the other hand, because of the complexity of its processes, has yet to achieve fully its status as a science.

Some of the problems of elevating extractive metallurgy to such a status become apparent in even a casual look at what is involved. Its processes are concerned, primarily, with the recovery of metal from ores of variable chemical composition and concentration. The metals usually are contained as relatively complex inorganic chemical compounds called minerals, which react much more slowly than most other inorganic chemicals. The mineral grains are mixed with inert or even harmful gangue or waste material, which has little or no value. These materials often must be separated by physical means before the mineral concentrate can be treated chemically to recover valuable compounds or the metals themselves. Extractive metallurgy processes involve reactions between solid mineral grains and chemical reagents which may be (1) other solids, (2) liquids (usually solutions), or (3) gases. Many of these reactions take place at elevated temperatures and under conditions which do not lend themselves to accurate measurement of temperatures, local concentrations, or actual reaction rates.

Fluidized-Bed Systems

Within the last ten years, an almost revolutionary process—the fluidized bed—has helped to change the extractive metallurgy picture. Now, for the first time, it appears possible to approach a variety of extraction

problems scientifically because of the improved control the technique allows.

A fluidized bed is a system containing both a solid and a gas. The solid is always a well-defined mass of broken or finely divided materials which are usually one-half inch or less in diameter. This material is so arranged in a retaining vessel that it can be fluidized by passing a gas upward through the voids between the particles at sufficient velocity to support them and give them freedom of movement within the mass. The gas used to fluidize the bed of particles may or may not take part in the reaction.

Fluidized-bed reactors have several features which enable a variety of types of processing. Through the combustion of fuel oil, powdered coal, or fuel gas in the bed, it is possible to carry on processes at high temperatures. The fuel is either mixed with the materials to be processed, sprayed into the bed, or provided in the fluidizing gas. The reaction processes may also be carried out under pressures up to 450 psi and in partial vacuum down to 10 mm of mercury.

Most fluidized beds are operated continuously. The material to be reacted is introduced at one point and distributed by the motion of the bed during reaction. The product is then discharged at another point. Some of the systems that may be operated as fluidized beds are presented in the table on page 12.

Factors Important in Fluidized-Bed Operations

The uses to which fluidized beds may be put depend, of course, upon the operating characteristics of the equipment. The following discussion presents some of the physical conditions and factors which help determine the types of processes that can be advantageously carried through in fluidized-bed reactors.

Size of Materials. In normal practice, the particles to be processed should be no larger than one-half inch in diameter so as not to be too heavy to be lifted by the gas. On the other hand, if the particles are too fine, they tend to ball up in spheres, thus decreasing the efficiency of gas-solids contact. Materials ranging in size size down to 95 per cent minus-200 mesh, and in one experiment, particles less than 40 microns (325-mesh size) have been processed successfully. However, in most cases such small particles are likely to interfere with the efficient operation of the fluidization bed.

When particles are too fine (often less than 200 mesh), many of them also tend to be carried through the fluidizing bed in the gas stream. The rapid passage through the bed does not allow time for complete reaction between the particle and the fluidizing gas for some materials. When the time for reaction is insufficient, it is usually necessary to separate the particles from the gas stream in a cyclone or Cottrell dust collector and recirculate them through the bed so as to permit a more complete reaction. Some finely divided materials, such as limestone or dolomite seem to be completely decomposed in a single rapid pass through a bed. Also, finely divided sulfide particles may be roasted to an oxide containing less than one per cent sulfide sulfur in one passage.

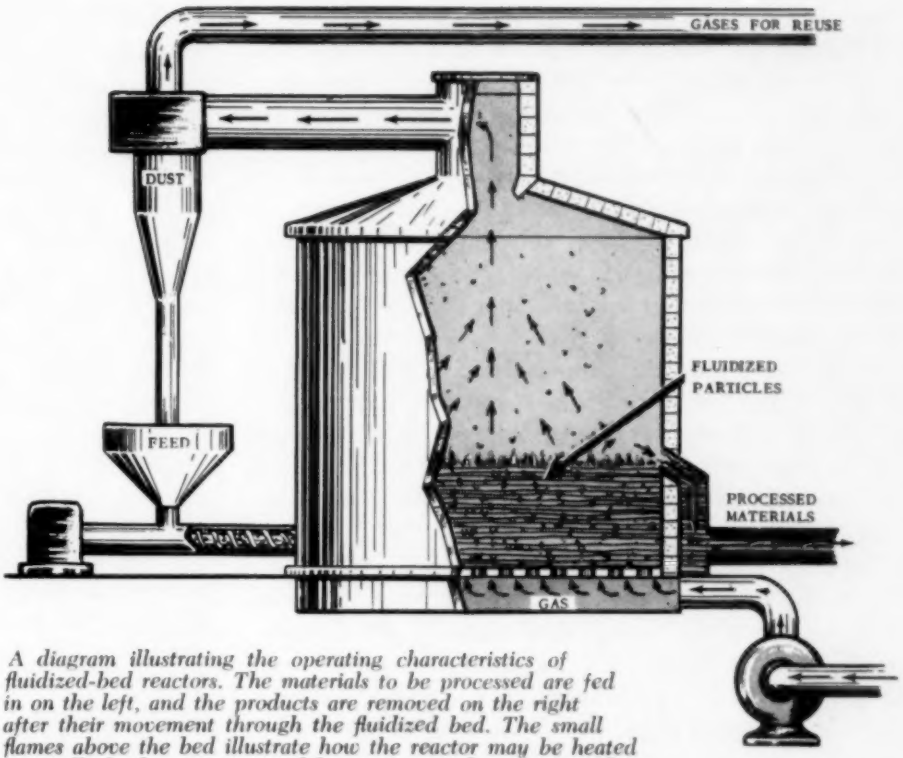
Pelletizing. Dust losses can be minimized by pelletizing feed material for fluidized beds. Thus it is customary to bind some fine materials into 1/10 to 1/4 inch pellets with clay or some organic material before processing. Pyrite, for example, is frequently pelletized

Dr Coffer has studied the problems connected with the operation of fluidized beds in extractive metallurgy, and he participated in research on such fluidized-bed processes as the oxidation and reduction of minerals, the concentration of germanium from ores, metal-chloride production, and the recovery of metals by evaporation. The author has aided in the adaptation of fluidized beds to sulfide roasting processes and to the decomposition of dolomites. He has also cooperated in the perfection of a carbonile process for recovery of nickel, development of techniques for winning uranium from ores, iron-ore reduction, high-pressure leaching of ores, and aluminal-thermic reduction of oxides to produce alloys. Before joining Battelle, Coffer was associated with the Climax Molybdenum Company.

Since joining Battelle in 1942, Frank Stephens has participated in and directed a variety of extractive-metallurgy studies. Among problems engaging his attention has been the extraction of nonferrous metals, including nickel and cobalt, of newer metals such as germanium, uranium, titanium, and columbium, and of iron from several types of ore. He has directed process-development studies on the leaching of uranium ores, carbonile processes for nickel and iron, chloride metallurgy, and direct reduction procedures. Stephens has also been associated with research on equipment for fluidizing-bed and high-pressure leaching systems. Currently a member of the Committee on Thermal Drying of Fine Coal, he has served on numerous other committees of the Extractive Metallurgy and Minerals Beneficiation Division of the American Institute of Mining, Metallurgical, and Petroleum Engineers. One of his papers, "The Reduction-Oxidation Processes for the Treatment of Taconites", received the 1953 *Journal of Metals* Award.

before it is burned to produce sulfur dioxide.

A self-pelletizing reactor has been developed which is of great interest for a number of applications. Operation of this reactor requires that at least one of the materials be liquid or plastic at some stage of the reaction. As the finely divided feed material enters the reactor, the impinging feed particles are held to the larger bed granules by surface tension, thus building the granules into spheres. The spheres are prevented from sticking to each other by the shearing action imparted from the high velocity of the gas.



A diagram illustrating the operating characteristics of fluidized-bed reactors. The materials to be processed are fed in on the left, and the products are removed on the right after their movement through the fluidized bed. The small flames above the bed illustrate how the reactor may be heated internally by burning material being processed, fuel injected into the reactor, or fuel fed with the material.

Factors in Reaction Rate. Reaction rates in fluidizing beds are determined, of course, by the nature of the products. Naturally, reactions between solid particles and fluidizing gases take place at or near the gas-to-solid interface. If the reaction products are gases, they are moved away quickly by the fluidizing gas stream. The rate of reaction, then, is determined by the reactant gas concentration and the solid surface area with which it interacts, and the reaction rate should remain steady if the gas composition is constant. For example, the fluidized-bed reaction between chlorine gas and ferrous chloride is so efficient in forming ferric chloride at temperatures above its boiling point that little excess chlorine is found in the effluent gases.

If one of the products of a gas-to-solid reaction is another solid, the reaction rate will depend upon the nature of the solid formed. A "critical-density ratio" has been suggested by N. B. Pilling and R. E. Bedworth to explain some differences in the rates of oxidation of metals.

Their ratio is determined by dividing the molecular volume of the reaction product by that of the reactant. If this ratio is less than one, the product occupies less volume than the reactant and will form a porous layer on the reacting solid; then the reacting gas can get to the reactive surface and the product gas can get away from it quickly so that the reaction is not slowed by diffusion. On the other hand, if the ratio is greater than one, the product will occupy more volume than the reacting solid, and the product will form a dense film, slowing the reaction. The evidence indicates that metals whose oxidation showed a critical density ratio less than one, oxidized at constant rates, metals whose oxidation gave ratios greater than one, however, showed parabolic oxidation-rate curves falling off rapidly as the oxide layer thickened.

For example, the oxidation of pyrite to ferric oxide has a critical density ratio of 0.636 and pyrite is easily roasted to iron oxide in excess air to form ferric oxide and sulfur dioxide. The ferric oxide is formed as a porous solid which permits the rapid diffusion of oxygen and sulfur dioxide through the oxide layer so that the rate of oxidation is not limited except in the presence of extremely large particles.

On the other hand, sulfate roasting of pyrite to form ferric sulfate (ratio 2.69) and the oxidation of pentlandite to ferric oxide plus nickel sulfate (ratio 1.37) are difficult to accomplish in practice. The reactions proceed satisfactorily for a limited period and then the thickening film slows the process at a steep rate.

One method for overcoming the problem of a slowing reaction such as that described above is to dissolve away the reaction product and re-treat the material. A possible solution to a single-step sulfating roast would be the addition of a reagent to change the character of the film so that it would become more permeable or flake away, allowing the reaction to continue.

The reaction process in a fluidized bed may also be

affected by changes in the composition of the gas moving through the bed. In some processes the volume of the fluidizing gas may be reduced by being used up in the reaction. In other processes, a gas may be produced which increases the gas volume and velocity. In either case, the fluidization characteristics of the bed will be changed.

When the upward velocity of the gas through the fluidized beds exceeds the settling rate, particles are entrained and carried out of the bed. The rate at which particles settle through a gas can be calculated. It is directly proportional to the square of the radius of the particle and the difference in density between the particle and the gas. It is inversely proportional to the viscosity of the gas and is influenced by the particle shape, with spheres settling most rapidly.

Some processes, such as the reduction of oxides by hydrogen, convert some hydrogen to water vapor, thus increasing the density and viscosity of the gas stream. The oxidation of a sulfide, by means of the oxygen in the air to produce sulfur dioxide, on the other hand, would lower the viscosity of the gas and, consequently, decrease the size of the particles that would be entrained. As shown in the chart on page 13, gas viscosity increases appreciably with temperature. An increase in temperature of the bed will increase entrainment by increasing both gas volume and viscosity.

A final factor which is important in fluid-bed processes is the uniformity of the size of particles. Materials composed of particles varying widely in size contain a lower percentage of voids than materials of more uniform size. Therefore, the velocity of the fluidizing gas will be greater through the smaller area between various-sized particles, than through the larger areas provided by equal-sized particles. The increased interstitial velocity between the unevenly sized particles consequently permits their fluidization with smaller amounts of gas in a given piece of equipment.

Self-Perpetuating Fluidization. To be successful, the fluidization operation must be self-perpetuating. During operation, most of the fluidized bed consists of the finished product; only a few per cent is composed of newly-fed and partly-processed materials.

If, for any reason, the product does not keep its identity as separate particles, normal fluidization is not possible. To retain fluidization, therefore, the process must handle varying conditions in materials. In some systems, the feed is pumped in as a slurry or suspension of particles, and the wet material goes through a plastic stage during drying. If the dried material breaks up into particles of the same size as the bed material, no difficulty is encountered. When materials are used which go through reactions tending to make them adhere to similar neighboring particles, fluidization will not be interrupted if the sticky particles are few and well dispersed until they lose their adhesive properties in the process. If, however, plastic particles do agglomerate, they will sink to the bottom of the bed and interrupt the gas flow and, therefore, fluidization. In instances where such masses are formed or where unusually coarse feed material is used, fluidization is sometimes possible with a properly designed reactor. A bottom discharge permits continuous elimination of settled material, thus keeping the bed fluidized while minimizing dust losses because gas velocity need not be increased to maintain fluidization.

Applications of Fluidized Beds

While the fluidized bed is used in many chemical-processing applications, especially in the petroleum industry, the examples presented below are drawn from the field of extractive metallurgy. The illustrations have been selected to suggest some of the types of processes that can be carried out advantageously in fluidized-bed reactors. The specific advantages, in each case, are pointed out in the discussion.

1. Calcination of Limestone

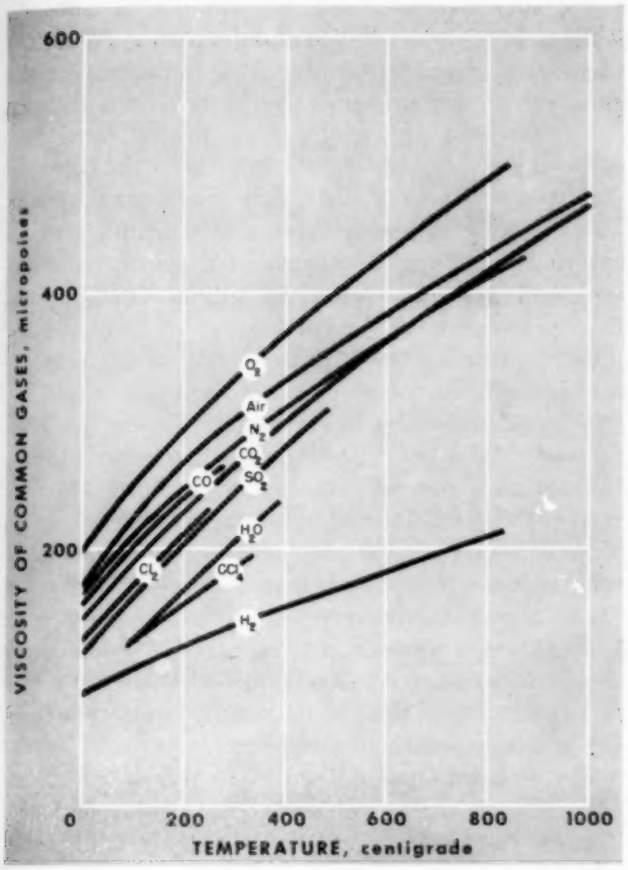
The first commercial operation of a fluidized-bed reactor of interest to the extractive metallurgist was the calcination of limestone. While the first reactor built was a five-foot-diameter unit with a capacity of 11 tons of lime per day, a 12-foot-diameter unit was constructed later, with a capacity of 100 tons per day. The latter is a multiple-bed unit having five beds positioned one above the other. The top three beds

Typical Reactions in Fluidized Beds

$\text{Solid} \xrightarrow{*FG} \text{solid} + \text{Gas}$	$(CaCO_3 \rightarrow CaO + CO_2)$
$\text{Liquid} \xrightarrow{FG} \text{Solid} + \text{Gas}$	$[Mn(NO_3)_2\ \text{soln} \rightarrow MnO_2 + H_2O + 2NO_2]$
$\text{Gas} \xrightarrow{FG} \text{Solid} + \text{Gas}$	$[Fe(CO)_5 \rightarrow Fe + 5CO]$
$\text{Solid} + \text{Gas} \xrightarrow{FG} \text{Solid}$	(Cleaning H_2S out of gas)
$\text{Solid} + \text{Gas} \rightarrow \text{Solid} + \text{Gas}$	$2FeS_2 + 5\frac{1}{2}\ O_2 \rightarrow Fe_2O_3 + 4SO_2$
$\text{Gas} + \text{Gas} \rightarrow \text{Solid} + \text{Solid}$	$(TiCl_4 + 4Na \rightarrow Ti + 4NaCl)$
$\text{Gas} + \text{Gas} \rightarrow \text{Solid} + \text{Gas}$	$(MoCl_5 + 2\frac{1}{2}\ H_2 \rightarrow Mo + 5HCl)$
$\text{Solid} + \text{Solid} + \text{Gas} \rightarrow \text{Gas} + \text{Gas}$	$(TiO_2 + C + 2Cl_2 \rightarrow TiCl_4 + CO_2)$

* Fluidizing Gas

VISCOSITIES OF COMMON GASES



are used for preheating the incoming limestone and the fifth bed is used to preheat the air and cool the calcine. The actual calcination takes place in the fourth bed where the temperature is maintained at 1700 F by injection of Bunker C oil directly into the bed. Fuel consumption is reported to be about 40 gallons per ton of lime as compared to 60 gallons per ton required for rotary-kiln operation. Calcination is over 99 per cent complete. Oil combustion is so efficient that the exhaust from the reactor contains less than one per cent oxygen, 0.2 per cent CO, and 32 per cent CO_2.

2. Self-Pelletizing Calciner

A self-pelletizing reactor is being operated for calcining water-treatment sludge (calcium carbonate). In this operation, a finely divided, precipitated, calcium carbonate is mixed with a small percentage of sodium carbonate and fed to a bed of fluidized pellets at 1700 F. Most of the powder sticks to the pellets in the first pass through the reactor and the remainder is recirculated to the bed. The pellet formation is caused by fusion of the sodium carbonate to act as a binder for the calcium carbonate. Calcium carbonate is calcined to CaO and the product is discharged as pellets varying from 1/10 inch to 1/4 inch in diameter.

3. Roasting of Sulfide Ores

Sulfide roasters are used for producing sulfur dioxide (useful in making sulfuric acid and sulfite liquors for paper processes) and to produce a calcine for the extraction of valuable metals. The advantage of the fluidized bed for roasting metal sulfides is apparent to anyone who has operated a hearth roaster, the predecessor of the fluidized bed. In hearth roasting, the sulfide ore is spread over a circular hearth and is stirred by rotating plows. Temperatures vary greatly as can readily be seen by differences in color of the roasting material.

Fluidized beds, because of the frequent contacts between particles and the uniform gas distribution, permit control of temperatures to such an extent that all parts of the bed are within a few degrees of each other. This control enables operation at a temperature which favors the desired reaction and minimizes overheating and sintering of parts of the roast. Use of fluidized beds for roasting sulfides has other advantages. Because very little excess air is used, the exhaust gas contains 12 to 14 per cent sulfur dioxide as compared to only five to six per cent sulfur dioxide for hearth roasters. Also, the fluidization process operates on material with a much lower sulfur content because of the larger reservoir of heat available to keep the reaction going and more efficient use of air so that there is less cooling by gases.

Sulfate roasting is a process for converting the sulfide or oxide of a metal to the sulfate. Separations between some metals which occur together as sulfides can be based on the differences in decomposition pressures of their sulfates. For example, iron sulfate decomposes at a lower temperature than do the sulfates of copper, cobalt, and nickel. A company in Japan is sulfating 80 tons of copper-zinc concentrates per day in a 20-foot-diameter reactor. The reaction can be controlled to give a calcine from which as much as 96 per cent of the copper and 92 per cent of the zinc can be leached in weakly-acid-spent electrolyte while 96 per cent of the iron remains as insoluble ferric oxide.

4. Reduction Roasting

In contrast to sulfide roasting, reductions of metallic oxides usually call for relatively high temperatures and require supplementary heat. While heat transfer in a fluidized bed is excellent, the large cross section of the bed and the poor heat conductivity of most refractories have prevented attempts to heat large beds through the reactor walls. Instead, the reacting materials and gases are usually preheated or the reduction may be conducted in hot combustion gases which contain excess reducing agents.

A reducing roast on an iron-containing material

reduces the ferric oxide to Fe_3O_4 or Fe. These are magnetic and can be concentrated as desirable products, or removed if undesirable, by magnetic separation equipment.

Probably the oldest application of a fluidized bed to treatment of oxidized iron ores is a reducing furnace patented by C. E. Robinson in 1879. It included almost all the features claimed by modern fluidized beds including a means for introducing gas into a boiling bed of particles. One of the newest processes, the H-Iron Process for the direct reduction of iron ore, is based on reactor operation at pressures up to 450 psi.

5. Chlorination

The Kroll Process for the production of titanium requires pure titanium tetrachloride which is prepared by the chlorination of rutile in the presence of carbon. Many commercial producers of titanium tetrachloride now operate beds, using chlorine as the fluidizing gas.

Kellogg has published thermodynamic calculations to show that the oxides of silver, mercury, lead, cadmium, copper, manganese, nickel, zinc, tin, and iron can react with chlorine to form chlorides of metals. The reaction rate is not indicated by these data. If carbon or sulfur is present, it reacts with the oxygen contained in the oxide to promote reaction of the metal with chlorine. Therefore, in the presence of carbon, it is possible to chloridize magnesium, chromium, titanium, aluminum, silicon, columbium, and zirconium oxides in addition to those metals that can be chloridized without a reducing agent to take up oxygen. Moreover, sulfur, present in many ores, can act as an oxygen remover in chloridizing reactions. Because fluidized bed offers temperature control, a choice of refractories, and gas tight systems for operation, its future in chlorine metallurgy seems assured.

Possible Future Developments

The fluidized bed is a proved commercial piece of equipment. It is not a panacea for all solid-gas reactions, but it does have the advantages of good solids-gas contact, control of atmospheres, and uniform temperatures. As described above, it has become an accepted method for roasting sulfide ores, and some of its other potentialities are being explored. New uses are being proposed frequently; for example, an Australian patent proposes to produce titanium metal in a fluidized bed of sodium chloride by reacting titanium tetrachloride with sodium vapor.

The fluidized bed offers excellent possibilities in nitrate decomposition. In the process, the desired metal, such as manganese or uranium, is put into solution as a nitrate; the solution is then sprayed into a heated fluidized bed of the oxide to decompose the nitrate. Nitrogen oxides are recovered from the gas.

Another field of usefulness for the fluidized bed, based upon the wide differences that exist between the vapor pressures of the sulfides, has been proposed. This suggests the possibility of eliminating and recovering volatile sulfides such as those of cadmium, lead, and germanium from zinc sulfide. These separations probably could be carried out by fluidizing the sulfide mixtures in inert gases heated to the temperature required for vaporization of the volatile sulfide.

The self-pelletizing fluidizing-bed reactor has been discussed. The great possibilities in the use of such reactors have not been thoroughly explored. For example, the possibility of operating fluidized beds in place of rotary cement kilns and in the processing of lithium ores is only now being considered. Any system containing at least one component that passes through a sticky stage in reaching the reaction temperature should be considered. If the material does not melt down completely during processing, the self-pelletizing bed technique may be applicable.

The use of a fluidized bed as a condenser for volatile materials such as chlorides has been mentioned. The possibility of condensing the volatile solid on the bed particles rather than on stationary heat transfer surfaces invites investigation. It could pay off with some radical new designs and a considerable saving in maintenance of condensing systems. The condensed product could discharge continuously as free-flowing granular material instead of being scraped off heat transfer walls of ordinary condensing systems.

This article has briefly described fluidized-bed systems and illustrated some of their uses in the field of extractive metallurgy. At the same time some specific problems have been discussed to show how such systems might be improved or modified to improve present practice or to adapt fluidized beds to various processes. It is not possible to cover all of the reactions where its use might be advantageous. Indeed, the fluidized bed is also widely applied in the chemical industry, where additional processes might also be developed. Generally, it may be said that the fluidized-bed system is a promising method for carrying on any process involving one or a combination of the following conditions: (1) Close temperature control; (2) broad temperature range; (3) controlled atmosphere in a closed system; (4) rapid heat transfer; and (5) the handling of finely-divided particles.

NOTES from BATTELLE

* ROSE BLACKSPOT DISEASE

The blackspot disease (diplocarpon rosae), which causes rose bushes to lose their leaves, has long been a serious problem with rose growers. Those concerned with the problem would like to know how the fungus responsible for blackspot attack is related to the loss of leaves.

A research program, cooperatively supported by Battelle and the American Rose Foundation, with headquarters also in Columbus, Ohio, has been initiated at the Institute to study the problem of blackspot attack upon roses. Spearheading the research is Harold E. Kazmaier, Battelle plant pathologist, who will have the assistance of other specialists at the research center. The Foundation's part in this and other studies concerned with rose culture, is financed through donations from home gardeners to the ARF's research committee headed by Dr. Cynthia Westcott.

The scientists will specifically seek to learn why, in some instances, leaves drop off when only a small portion of each leaf is affected, while in other instances, leaves remain on the plant even after they are extensively infected by the fungus. The question of how environment influences loss of leaves is a part of the problem. Also to be determined is whether different strains of the fungus cause different patterns of defoliation.

"From a practical point of view," Kazmaier observes, "it is most important that we understand why certain species or varieties of the rose hold their leaves despite the presence of blackspot fungus. It is not the mere presence of fungus on leaves, but its destructive effect on the plant, through repeated defoliation, with which we are concerned."

Initially, the problem will be attacked from several different angles, Kazmaier said. Varieties and species of roses exhibiting extreme resistance and susceptibility to blackspot defoliation will be studied. At the same time, an attempt will be made to find a race, or variety, of the fungal pathogen that behaves differently on different species of the rose. Battelle scientists will seek to determine if blackspot defoliation is related to the nutritional status of roses or to inherent characteristics of the plants.

* CANCER CHEMOTHERAPY

A study of substances for possible use against cancer has been launched at Battelle. The research, sponsored by the Public Health Service, will be concerned with the evaluation of chemicals and antibiotic filtrates, which are mixtures of chemicals produced by bacteria and molds. The substances will be evaluated for their effectiveness against three forms of cancer in mice—leukemia, breast cancer, and a tumor of connective tissue.

The Battelle investigations, in addition to searching for new agents to treat cancer, will seek improved methods for testing compounds, and will include toxicity studies on antibiotic culture filtrates.

If they prove worthwhile and safe for humans, the chemicals found through work such as Battelle is undertaking will be made available for studies in hospitals and clinics cooperating in a national cancer chemotherapy program.

Battelle is one of several laboratories around the country cooperating in the cancer chemotherapy program. Its $229,418 contract is administered by the Public Health Service's Cancer Chemotherapy National Service Center at the National Cancer Institute, Bethesda, Maryland.

Besides the National Cancer Institute, sponsors of the National Chemotherapy research program include The American Cancer Society, the Damon Runyan Memorial Foundation, the Veterans Administration, the Atomic Energy Commission, and the Food and Drug Administration.

* PROMISING RESISTOR MATERIAL

Fixed film resistors possessing a high degree of stability at elevated temperatures are increasingly important, with the development of missiles and higher-speed aircraft. A recent study sponsored by the U. S. Air Force sought resistive elements with (1) a resistance stability of about five per cent in 5000 hours under load at 250 C, (2) high film resistance, and (3) a temperature coefficient of resistance of less than 100 ppm/C over the range

—65 to 250 C. In this connection, mixtures and alloys of chromium and silicon and of chromium and silicon with an added element, were studied at Battelle.

Charles M. Chapman and Edwin H. Layer, Battelle technologists, report that to date the investigation has shown that the most promising films are those prepared from combinations of chromium and silicon only. All of the chromium-silicon films are very hard and highly adherent to Pyrex and Vycor bases. Therefore such films may be particularly suited for potentiometers for use in high-temperature environments. In order to evaluate the materials fully, some further studies are necessary to provide data on life under load, voltage coefficient of resistance, and temperature coefficient of resistance over the temperature range —65 to 250 C. If these properties prove satisfactory, chromium-silicon must be considered very promising for stable film resistors at the desired temperatures.

* SELF-POWERED FLASHBULB

An experimental type photographic flashbulb that incorporates the power source within the bulb itself has been developed at Battelle. It carries within its metal base a small and relatively simple primary cell composed of alternating thin layers of magnesium foil, absorbent paper, and copper that has been silver plated. This "sandwich" is wrapped around the interior of the standard metal base of a flashbulb, thus forming a liner which provides a square-inch of cell surface to generate power.

The miniature cell begins to produce power when the base of the bulb is moistened with a few drops of water. It will continue to produce sufficient power for about 20 minutes to flash a bulb. This allows ample time for the photographer to "set up his shot" and trigger his flash unit.

Dr. John McCallum, leader of the Battelle research team that was responsible for the development, reports that there are no plans at present for the bulbs to be produced commercially. The experimental bulb, he explains, "is simply the end product of our research to determine how compact and simple a power cell we could build."

The small primary cell built into the experimental bulbs is a modified and miniature version of the type developed during World War II to power emergency radio transmitting equipment packed with life rafts. It is generally identified as the "sea water battery". However, this cell is as readily activated by fresh water.

* REACTOR GAS-TURBINE SEALS

A rotating shaft seal to meet "unusual" demands is the goal recently set for technologists at Battelle. Working under contract to the U. S. Army Engineer Research Development Laboratories, Battelle technologists hope to find a rotating shaft seal that will withstand the heat and pressure of a gas-turbine nuclear power plant.

The Army Engineers' requirements are that the seal work efficiently for thousands of hours on a turbine-compressor unit operating at about 25,000 revolutions-per-minute at a peak pressure of about 1,000 pounds per square inch and a peak temperature of about 1350 F. Moreover, the seal must be able to keep leakage of the helium working fluid at a minimum. Leakage must be so slight that it will not be necessary to add helium to the circulatory system for a matter of months.

The current goal of the Battelle research team, according to W. H. Goldwaite, chief of the Institute's engineering mechanics division, is to examine the performance of rotating seals subjected to rigorous laboratory experiments. In this way, the technologists will gain information to determine suitability of seals for the intended application. If the characteristics of conventional seals prove unsatisfactory, a longer-range goal would be to find the right combination of materials and design to meet plant specifications.

Engineers at the Army Engineers' Fort Belvoir Laboratories have accumulated considerable experience with gas-cooled turbine-compressor systems. Finding a practical solution to the rotating-seal problem, however, is necessary before a working model of a turbine can be built. Over-all aim of this Army project is to develop small nuclear power plants that can be used in the field for a variety of power-generation purposes.

* Ward F. Simmons has been appointed chief of Battelle's high-temperature metals research division. In his new position, Simmons takes charge of research in this specialized area of metallurgy with which he has been closely associated at Battelle for the past 17 years. His studies have ranged from the investigation of manufacturing variables affecting high-temperature properties of steels to the evaluation of super-alloys used in jet aircraft engines. Currently, Simmons serves on committee (A-10) on stainless steels of the American Society for Testing Materials. He is also a member of the Data and Publications Panel of the joint ASTM—American Society of Mechanical Engineers' committee studying the effect of temperatures on the properties of metals.

Writings by STAFF Members

Zone Melting and Crystal Pulling Experiments With AlSb. W. P. Allred, Bernard Paris, and M. Genser. *Electrochemical Society, Journal*, v. 105, February 1958, pp. 93-96.

High-resistivity AlSb ingots resulted from zone refining in Al_2O_3 crucibles. Most of the impurities segregated readily to the rear. Resistivity and Hall coefficients were determined for single crystals cut from a zone-refined ingot. Comparison of these crystals with those grown by the Czochralski technique indicated that the growth of high-purity crystals is limited by the purity of the alumina crucible and the Al.

Mescaline Analogs. VIII. Substituted 5-Methoxy- and 5,6,7-Trimethoxyindoles. F. Benington, R. D. Morin, and Leland C. Clark, Jr. *Journal of Organic Chemistry*, v. 23, *January* 1958, pp. 19-23.

Several 5-methoxy- and 5,6,7-trimethoxyindole derivatives have been synthesized by the cyclization of appropriately substituted open chain amines. Convenient syntheses of 1-benzyl-3-hydroxy-3-carboethoxy-5,6,7-trimethoxyindole and of 1-methyl-5-methoxyindole are described.

Effect of Dissolution on Oleopneumatic Shock-Strut Performance. Charles W. Bert. *Journal of the Aeronautical Science*, v. 25, February 1958, pp. 135-136.

Experimental data on pneumatic load-stroke performance in the case of static and slowly applied loading, such as found in gentle landings and taxiing, follow closely a theoretical curve determined while taking into account the effect of air dissolution in the oil. This curve differs significantly from that determined by simple air-compression theory. The latter remains valid for rapid loading because of the time lag between compression and dissolution.

The Effect of Extender Particle Size on the Gloss of Outside House Paints. B. G. Brand, R. J. Deibert, and E. R. Mueller. *Official Digest. Federation of Paint and Varnish Production Clubs*, v. 30, January, 1958, pp. 74-78.

Water-floated micaceous talc was fractionated using a Microplex Classifier, and the effect of the particle size of the various fractions on the gloss and viscosity of outside house paints was investigated. Optimum quality was obtained from micaceous talc when the particle size was between 7 and 30 microns diameter. It was shown that both larger and smaller particles are injurious to the gloss of the dried film. The distribution curve within the above range was found to be important.

Atomic-Age Metal Extraction. L. W. Coffer. *Chemical Engineering*, v. 65, January 1958, pp. 107-122.

Points out important advances and classifies the newer processes from the standpoint of the chemistry and metallurgy involved. Describes ion exchange, solvent extraction, and pressure techniques as revolutionizing the acid and alkali leach treatments. Discusses application of various methods in extraction of Nb, Zr, U, Ti, Hf, Mn, V, Co, Ta,, Th, Ni, Zn, and Au.

Members of the Battelle staff are authors of the recently published articles and books listed on these pages. In most cases, reprints are available from the Battelle Publications Office, 505 King Avenue, Columbus 1, Ohio.

Contract Chemical Research in Europe. Frank C. Croxton and M. A. W. Barnick. *Chemical Engineering Progress*, v. 54, January 1958, pp. 59-63.

Contract research by independent research organizations has rapidly developed in Europe since its introduction there in 1947. Research facilities in 17 countries are described. Rapid expansion in the future is anticipated.

Purifying Thorium Nitrate by Solvent Extraction. D. D. Foley and R. B. Filbert, Jr. *Industrial and Engineering Chemistry*, v. 50, February 1958, pp. 144.

Tributyl phosphate in a commercial hydrocarbon diluent was used to purify thorium nitrate by a liquid-liquid extraction method. The product was of acceptable purity with high recoveries of both product and reagents. Mass transfer equilibria for a continuous, countercurrent organic-aqueous system were developed, and operable conditions established.

Fatigue Behavior of Aircraft Structural Beams. W. S. Hyler, H. G. Popp, D. N. Gideon, S. A. Gordon, and H. J. Grover. *U. S. National Advisory Committee for Aeronautics, Technical Note* 4137, January 1958, 60 pp.

Fatigue and related static tests were made on Al alloy box beams and I-beams and also on elements simulating key failure locations in the two beams. The study indicates that the simulation approach will be useful for those cases where it is possible to assess reasonably factors contributing to stress-raisers in the structure.

Titanium Technology. I. R. I. Jaffee. *Modern Metals*, February 1958, p. 46 + 4 pages.

Future possibilities for titanium, data on U. S. sponge producers and ore reserves, and the latest techniques in extractive metallurgy, melting, and casting are reported.

Production Practices in the Fabrication of Stainless Steel Honeycomb Sandwich Structures. W. J. Lewis, G. E. Faulkner, and P. J. Rieppel. *Tooling and Production*, v. 23, January 1958, pp. 73-77.

Stainless steel honeycomb sandwich structures are currently fabricated by brazing for use in aircraft and jet engine components. Both spot and seam welding are used to fabricate the core. There are two types of honeycomb core produced: expanded and preformed, depending on the manufacturing method. Fabrication of brazed sandwich panels follows usual brazing procedures in that close tolerances and extreme cleanliness are required. Machining, cleaning, and final assembly procedures are discussed.

Protective Linings for Steel Shipping Containers. Louis J. Nowacki. *Corrosion*, February 1958, pp. 60-62.

Factors affecting lining performance include such matters as metal surface conditions, chemical and physical characteristics of lining, and lining application and curing. Tests for linings and lined containers include product-resistance, coating continuity, lining thickness, reverse-impact resistance, and degree of cure. The types of lining materials available are described.

Some 2-Ethyl-4,6-Diphenyl-1,3,5-triazine Derivatives. **Uber einige Derivate des 2-Athyl-4.6-diphenyl-1.3.5-triazins.** Heinz Reinhardt and Erich Schiefer. *Chemische Berichte*, v. 90, no. 11, 1957, pp. 2643-2645.

Monochloro- and monobromethyl- as well as dichloro- and dibromethyl-compounds were prepared from 2-ethyl-4,6-diphenyl-1,3,5-triazine. The ethyl compound was transformed into 2-vinyl-4,6-diphenyl-1,3,5-triazine by means of thermal decomposition. By applying peroxides to the vinyl compound a high molecular polymer was produced.

The Computation of Fluid-Solid Counterflow Extractions for a Slow-Dissolving Process or in Simultaneous Adsorption Processes. **Berechnung der Gegen-Stromextraktionen Fest/Flussig Fur Langsam Verlaufende Losungsvorgange Oder Bei GleichZeitigen Adsorption-Svorgangen.** Erich Sattler-Dornbacher. *Chemie-Ingenieur-Technik*, v. 30, no. 1, January 1958, pp. 14-18.

Analyzes fluid-solid counter-flow extractions characterized either by a low rate of dissolution of the extract ,or by the adsorption of the extract in the material. Describes graphical and calculation procedures which give better results than methods commonly in use.

WORLD-WIDE ABSTRACTS

in the FIELDS *of*

233a Aeronautical Engineering
234a Agriculture
235a Biochemistry and Biophysics
240a Ceramics and Concrete
241a Chemical Engineering
243a Chemistry—Analytical
247a Chemistry—Inorganic and General
248a Chemistry—Organic
254a Chemistry—Physical
260a Coatings
262a Control Systems, Computers, and Systems Engineering
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265a Electronics
269a Engineering Economics
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270a Food Technology
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272a Geology, Geophysics, Mineralogy, and Mining Engineering
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274a Heat Power
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281a Metals—Extraction and Refining
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283a Metals—Foundry Practice
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293a Nuclear Physics, Nucleonics, and Radiation
297a Operations Research and Management Engineering
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BATTELLE Technical Review ABSTRACTS

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***Asterisks mark items that may be used in the Battelle Library only. None of the unbound materials listed below are available for interlibrary loan.**

AERONAUTICAL ENGINEERING

4645 Russia's Civil Aviation Network. *Aeroplane*, v. 94, Jan. 3, 1958, p. 11-14.

Surveys the internal air services of Russia.

4646 Establishment of Lift on an Aerofoil With a Jet Flap. II. Wing of Finite Span With Trailing Edge Jet. R. Hirsch. *Aircraft Engineering*, v. 30, Jan. 1958, p. 11 + 8 pages.

Configuration of the vortex system. Variation of the trailing-edge radius of curvature. Expressions for the circulation and the induced lift and drag coefficients.

4647 Optimum Pay-Load-Ratio Relation for Multiple-Stage Rockets. G. Leitmann. *American Journal of Physics*, v. 26, Jan. 1958, p. 28-30.

The burn-out velocity of a multiple-stage rocket is higher than that of a single-stage rocket of the same over-all mass ratio. The over-all pay-load ratio of a multiple-stage rocket required to reach a given velocity is minimum when the pay-load ratios of all stages are equal.

4648* Solid Propellants and the Conquest of Space. Harold W. Ritchey. *Astronautics*, v. 3, no. 1, Jan. 1958, p. 39 + 5 pages.

Best way to achieve very high thrust needed to lift heavy loads associated with space flight is by scaling up single solid engine for the first stage.

4649* Aspects of Vanguard Propulsion. Kurt R. Stehling. *Astronautics*, v. 3, no. 1, Jan. 1958, p. 44 + 4 pages.

Previously established techniques as well as new approaches have been used to find the answers to major technical problems.

4650* Navigation in Space. J. M. Wuerth and J. M. Slater. *Automation Progress*, v. 3, Jan. 1958, p. 4-6.

Techniques such as maintaining orbit, inertial guidance, and determining path are discussed.

4651 An Evaluation of Russia's Missile Program. Richard E. Stockwell. *Automotive Industries*, v. 118, Jan. 1, 1958, p. 103-104.

Types and sizes of some of Russia's missiles.

4652 USAF School Simulates Living in Space. Craig Lewis. *Aviation Week*, v. 68, Jan. 27, 1958, p. 49 + 7 pages.

To learn the effects of space environment on humans, the Air Force's space medicine experts are conducting basic research in space cabin simulator, psychological effects, flight programs, and photosynthesis.

4653* Aerophysical Problems of Flight at Extreme Altitudes and Speeds. G. N. Patterson. *Canadian Aeronautical Journal*, v. 4, Jan. 1958, p. 3-10.

Basic physical effects of high altitude; interaction of a gas molecule with a solid wall; slip flow; the boundary layer in a rarefied gas; limit of free molecule flow. (To be continued.)

4654* A Swiss Guided Missile. E. Stehli. *Discovery*, v. 19, Jan. 1958, p. 24-28.

In Switzerland a guided missile has been developed during recent years by private enterprise. The present stage of progress in the development of this missile is summarized.

4655 Inertial Guidance for Rocket-Propelled Missiles. William T. Russell. *Jet Propulsion*, v. 28, Jan. 1958, p. 17-24.

Precision gyroscopes, accelerometers, and stabilized platforms are described.

4656 Aerodynamics of Nonuniform Flows as Related to an Airfoil Extending Through a Circular Jet. Scott Rethorst. *Journal of the Aeronautical Sciences*, v. 25, Jan. 1958, p. 11-28.

A method for determination of the downwash. This solution for values of downwash was then employed in lifting surface theory to determine the lift distribution on a wing extending through a circular jet.

4657 Anti-ICBM—Myth or Method? *Missile Design and Development*, v. 4, Jan. 1958, p. 11-14.

Formidable technical problems confront a defense system.

4658 Ground Support Equipment. *Missile Design and Development*, v. 4, Jan. 1958, p. 16-18.

Two types of equipment and their design and guidance problems.

4659 Roundup of Surface Equipment Contractors. *Missiles and Rockets*, v. 3, Jan. 1958, p. 74-79.

Lists a sampling of the vast missile industry, including major missiles and their prime contractors, companies producing radar, ground control, handling, and service equipment for the different missiles.

4660 Detached-Shock Calculations by Power Series. I. R. D. Richtmyer. *New York University (U. S. Atomic Energy Commission)*, NYO-7973, Oct. 1957, 49 p. (UF767 U3ny Contin.)

A method for calculating the flow of an inviscid, ideal gas between a blunt body moving at high Mach number and the detached shock that precedes it.

4661 Aluminium Alloys in Aircraft Structures. G. Meikle. *North Atlantic Treaty Organization, Advisory Group for Aeronautical Research and Development Report* 102, Apr. 1957, 12 p. (TL565 Ag11r Vis.)

Compositions of three groups of Al alloys used in the United Kingdom are discussed in relation to alloys used in the U. S. A. The elevated temperature properties of these alloys are considered because of their great importance where kinetic heating is involved.

4662 Design and Operation of Hypersonic Wind Tunnels. R. Smelt and James C. Sivells. *North Atlantic Treaty Organization, Advisory Group for Aeronautical Research and Development Report* 135, July 1957, 38 p. (TL565 Ag11r Vis.)

Problems discussed include air supply, diffuser efficiency, heater design and operation, nozzle design and calibration, and instrumentation. Real (imperfect) gas effects and the application of hypersonic-wind-tunnel results to flight problems are also discussed.

4663 The Use of Gun-Launched Models for Experimental Research at Hypersonic Speeds. Alvin Seiff. *North Atlantic Treaty Organization, Advisory Group for Aeronautical Research and Development Report* 138, July 1957, 21 p. (TL565 Ag11r Vis.)

Two ways of extending gun-launched model tests farther into the hypersonic Mach number range have been exploited. One is to use a counter current supersonic air stream flowing opposite to the free-flying model.

4664* Operational Requirements for a Collision Warning System. Eduardo I. Pina and Henry J. Landau. *Operations Research Society of America, Journal*, v. 5, Dec. 1957, p. 794-814.

Operational requirements are developed under the assumption of airplanes moving in straight line paths at constant velocities.

4665 Missiles of the U.S.S.R. Alfred J. Zaehringer. *Ordnance*, v. 42, Jan.-Feb. 1958, p. 639-642.

Recent disclosures of satellites and guided missiles show that the Soviets have modern weapons under development and in mass production.

4666* (Italian.) Research on the Velocity Variations in an Open-Jet Wind Tunnel and Attempts for Their Elimination. **Richerche sulle oscillazioni di velocità in una galleria aerodinamica a vena aperta e tentativi per eliminarle.** Carlo Grillo Pasquarelli. *Ricerca Scientifica*, v. 27, no. 10, Oct. 1957, p. 3001-3015.

Research performed in a 400 mm. diameter wind tunnel, at a maximum velocity of 100 m/sc. Fundamental oscillations occurred, with frequency increasing with increasing velocity, so that a whole number of half-wave lengths was contained in the length of the duct. Attempts to prevent the oscillations were unsuccessful.

4667* (Italian.) Contribution to the Study of Wakes in a Two-Dimensional Stream. **Contributo allo studio delle scie in corrente piana.** Cesare Gottardelli. *Ricerca Scientifica*, v. 27, no. 10, Oct. 1957, p. 3029-3039.

Some types of stable and transitory wakes were compared with theoretical wakes. Conditions suitable for their occurrence were examined, also the parameters for fluctuating vorticose wakes when dimensions of the obstacle varied.

4668 Rocket Power and Space Flight. G. Harry Stine. 182 p. 1957. Henry Holt and Co., New York. (TL782 St56r)

A simplified account of the development of rocket technology including details of design, construction, testing, propellants, and various problems of the conquest of space.

4669 Design and Operational Problems of the Transonic Jet-Driven Wind Tunnel. J. A. Kirk. *Royal Aeronautical Society, Journal*, v. 62, Jan. 1958, p. 6-11.

4670 Design and Operational Problems of the Electrically-Driven Transonic Wind Tunnel. R. Hills. *Royal Aeronautical Society, Journal*, v. 62, Jan. 1958, p. 12-16.

4671 Fabricating the Redstone Missile. *Steel*, v. 142, Jan. 20, 1958, p. 66-71.

Materials used are mainly Al alloys. It is produced with tools found in any well-equipped sheet metal shop.

4672 An Introduction to Aerodynamic Stability. Paul W. Rowe. *U. S. Atomic Energy Commission, Technical Memorandum*, SCTM 220-56 (51), Feb. 1957, 151 p. (UF767 Un3.1sct Contin.)

Includes an introduction to the concept of stability through use of mechanical and electrical analogies, an explanation of the forces acting upon an aerodynamic shape which affect aerodynamic stability, an analysis of the stability of aerodynamic shapes which possess one or two degrees of freedom.

4673 Physical Characteristics and Test Conditions of an Ethylene-Heated High-Temperature Jet. Roland D. English, Abraham Spinak, and Eldred H. Helton. *U. S. National Advisory Committee for Aeronautics, Technical Note* 4182, Jan. 1958, 28 p. (TL570 Un3t)

Results show the test section Mach number to be about 2.03. Reynolds numbers based on a length of 1-ft. varied from about 14×10^6 at a stagnation temperature of 1,000 R to about 2×10^6 at a stagnation temperature of nearly 5,000 R.

4674* (German.) Experimental Investigation of the Length of "Rolling-Up" of an Unstable Discontinuity Surface Behind a Wing of Finite Span. **Experimentelle Untersuchungen über die Aufspullänge der instabilen Unstetigkeitsfläche hinter einem Tragflügel von endlicher Spannweite.** Elmar Rohne. *Zeitschrift für Flugwissenschaften*, v. 5, no. 12, Dec. 1957, p. 365-370.

The length over which the trailing vortex sheet is rolled up into two vortex cores and the distance between the rolled-up vortices were investigated for a rectangular and a trapezoidal wing with GP 387 aerofoil sections, each with the wing tips sharp and rounded off.

See also: **4782** (ceramic radomes); **5235** (self-aiming guided missiles); **5266** (drives for missile support equipment); **5507** (ramjet in astronautics); **5576** (fatigue in aircraft structural beams); **5589** (new stainless for aircraft and missiles); **6004** (shock wave theory); **6026** (stretched acrylic aircraft glazing material).

AGRICULTURE

4675* Gibberellic Acid and the Reversal of Adult Hedera to a Juvenile State. William J. Robbins. *American Journal of Botany*, v. 44, Nov. 1957, p. 743-746.

Treatment of five year-old plants of *Hedera canariensis variegata* var. *arborescens* with gibberellic acid caused substantial growth as compared to untreated plants. Branches on some of the treated plants became completely juvenile.

4676* Irradiation of Developing Plant Embryos. I. Effects of External Irradiation (X-Rays) on Barley Embryogeny, Germination, and Subsequent Seedling Development. Leo W. Mericle and Rae Phelps Mericle. *American Journal of Botany*, v. 44, Nov. 1957, p. 747-756.

4677* A Study of the Infra-Red Absorption Spectra of Soils. R. A. Durie and Agnes Murray. *Australian Journal of Applied Science*, v. 8, Dec. 1957, p. 335-338.

Spectra of the organic fraction of soils were obtained by eliminating mineral matter by acid digestion. The spectra of the organic residue markedly resembled those of brown coals and lignites.

4678 Creeping Alfalfa. H. O. Graumann. *Crops & Soils*, v. 10, Jan. 1958, p. 18 + 2 pages.

Nomad, Rhizoma, and Rambler varieties of spreading alfalfa have been developed for, and released to American agriculture. Characteristics are discussed.

4679* (Russian.) Transformation of Methyl Alcohol in Fruits When Applied to Stimulate Their Ripening Process. **Prevrashchenie metilovogo spirta v plodakh pri stimuliatsii im**

protsessa sozrevaniia. Iu. V. Rakitin, A. V. Krylov, and G. A. Tarakanova. *Doklady Akademii Nauk SSSR*, v. 116, no. 5, Oct. 11, 1957, p. 874-877.

Methyl alcohol introduced in persimmons underwent a deep transformation and was decomposed with formation of carbonic acid. One-third was rendered harmless by volatilization and 3.6% remained combined.

4680* The Insecticidal Property of Petals of Several Common Plants of India. D. Seshagiri Rao. *Economic Botany*, v. 11, July-Sept. 1957, p. 274-276.

Kerosene extracts of petals of several flowering plants show insecticidal properties equivalent to or better than of 11% pyrethrum extract, a standard insecticide against indoor insects.

4681* A Study of Iron and Copper Requirements of Dairy Calves. Gennard Matrone, Cecil Conley, G. H. Wise, and R. K. Waugh. *Journal of Dairy Science*, v. 40, Nov. 1957, p. 1437-1447.

Investigations show that calves receiving no supplemental iron became anemic and gained less than those on 30 and 60 mg. intakes of iron daily.

4682* Effect of Diphenyl-*p*-Phenylenediamine on the Utilization of Carotene and Vitamin A by the Calf. F. Pirchner, R. S. Allen, and N. L. Jacobson. *Journal of Dairy Science*, v. 40, Nov. 1957, p. 1448-1456.

The toxicity of diphenyl-*p*-phenylenediamine (DPPD) and its effect on the absorption of vitamin A and carotene from the gut of the dairy calf was investigated. Growth was depressed when DPPD was first fed, but thereafter it had little effect on the health of calves as indicated by weight, blood cell counts, hemoglobin levels, and general appearance.

4683 The Formulation of Pesticides. W. Duyfjes. *Philips Technical Review*, v. 19, no. 5, 1957-1958, p. 165-176.

According to the way in which the preparation is to be used, differentiation is made between sprays, dusts, and aerosols. The sprays are subdivided into solutions, emulsions (stock emulsions and emulsifiable concentrates), solubilized solutions, and suspensions; the aerosols into smokes, liquid preparations for atomization, and fumigants. Briefly reviews formulation procedures and problems.

4684* (Italian.) Using P^{32} in Examining the Phosphorus Requirement of Tissues of Plants Invaded by Fungi or Viruses. **La richiesta di fosforo nei tessuti di piante invasi da funghi o da virus, esaminata con l'impiego del p^{32}.** Elio Baldacci, Eliseo Betto, Rita Foà, and Antonio Volpi. *Ricerca Scientifica*, v. 27, no. 9, Sept. 1957, p. 2674-2676.

Study of absorption and translocation, using P^{32} administered through the leaves in *Phaseolus vulgaris*. Application to plants infected by uromyces.

4685* Insecticide Resistance in Houseflies of Japan, Korea, and the Ryukyu Islands. Charles M. Wheeler, Harold D. Newson, and Theodore E. Blakeslee. *U. S. Armed Forces Medical Journal*, v. 9, Jan. 1958, p. 68-76.

The median-effective dose (M_{50}) values for DDT, lindane, dieldrin, and malathion were determined for 13 strains. Nearly all strains were highly resistant to DDT, and five strains also showed high resistance to lindane and malathion.

See also: **4705** (rearing germ-free animals); **4906** (pesticide residues).

BIOCHEMISTRY AND BIOPHYSICS

4686 Advances in Biological and Medical Physics. John H. Lawrence and Corneulius A. Tobias, editors. v. V. 488 p. 1957. Academic Press, New York. (QH505 Ad95 Vis.)

A collection of papers reviewing recent progress on several biophysical topics including: action spectroscopy, genetics of somatic mammalian cells, partial cell irradiation, antibody carriers of radioactivity, and techniques of low-level detection of radioactivity.

4687 The Behavior of a Bacterial Polypeptide as a Polyelectrolyte. Harold Edelhoch and J. B. Bateman. *American Chemical Society, Journal*, v. 79, Dec. 5, 1957, p. 6093-6100.

Light scattering and viscosity studies were carried out on the charged and uncharged forms of γ-D-glutamyl polypeptide (M=89,000) as a function of polymer concentration. The molecule shows fairly typical polyelectrolyte behavior.

4688 A Kinetic Study of the Ultraviolet Decomposition of Biochemical Derivatives of Nucleic Acid. I. Purines. M. J. Kland and L. A. Johnson. *American Chemical Society, Journal*, v. 79, Dec. 5, 1957, p. 6187-6192.

Irradiation of purines of biological interest with ultraviolet light gives decomposition rates which are zero between 8×10^{-5} and 5×10^{-4} M after an initial "induction" period.

4689 Thiamine Metabolism. I. The Metabolism of Thiazole-2-C^{14}-thiamine in Rat. J. M. Iacono and B. Connor Johnson. *American Chemical Society, Journal*, v. 79, Dec. 5, 1957, p. 6321-6324.

Over 60% of the radioactivity of intraperitoneally injected thiamine was excreted by the rat in the urine and only small amounts of radioactivity occurred in the feces and in the expired CO_2.

4690 The Constituents of *Casimiroa edulis* Llave *et* Lex. III. The Structure of Casimiroin. Alex Meisels and Franz Sondheimer. *American Chemical Society, Journal*, v. 79, Dec. 5, 1957, p. 6328-6333.

Casimiroin, a constituent of the seed and the bark of the tree *Casimiroa edulis* Llave *et* Lex., was shown through degradation to be 1-methyl-4-methoxy-7,8-methylenedioxycarbostyril.

4691 Physicochemical and Clotting Properties of *p*-Tolylazofibrinogen. John E. Fitzgerald and Walter L. Koltun. *American Chemical Society, Journal*, v. 79, Dec. 20, 1957, p. 6383-6387.

Some properties of bovine fibrinogen modified by coupling up to 50 *p*-tolylazo groups per mole fibrinogen (M = 330,000) were examined.

4692 Some Physical and Chemical Properties of the Ribonucleic Acid Contaminant of Rabbit Muscle Myosin Preparations. Elemer Mihalyi, Dan F. Bradley, and M. Irene Knoller. *American Chemical Society, Journal*, v. 79, Dec. 20, 1957, p. 6387-6393.

Describes procedures for separation and some of its physical and chemical properties. Methods involve selective denaturation of the myosin.

4693 The Isolation, Characterization and Amino Acid Sequence of a Melanocyte-Stimulating Hormone From Bovine Pituitary Glands. Irving I. Geschwind, Choh Hao Li, and Livio Barnafi. *American Chemical Society, Journal*, v. 79, Dec. 20, 1957, p. 6394-6401.

4694 Immunological Specificities Involving Multiple Units of Galactose. III. Michael Heidelberger, S. Alan Barker, and Bertil Björklund. *American Chemical Society, Journal*, v. 80, Jan. 5, 1958, p. 113-116.

Cross reactions of D-galactose-containing polysaccharides with Type XIV antipneumococcal serum are explored. Periodate-oxidized specific polysaccharide of Type XIV pneumococcus precipitates less than one-half of the antibody in the antiserum.

4695 The Alkaloids of *Tabernanthe iboga*. III. Isolation Studies. D. F. Dickel, et al. **IV. The Structures of Ibogamine, Ibogaine, Tabernanthine and Voacangine.** M. F. Bartlett, D. F. Dickel, and W. I. Taylor. *American Chemical Society, Journal*, v. 80, Jan. 5, 1958, p. 123-136.

Twelve compounds are isolated from the root.

4696* The Effects of Indoleacetic Acid, Sucrose, and Eugenol on Differentiation in Segments of Etiolated Pea Epicotyls. Richard A. Solberg and N. Higinbotham. *American Jornal of Botany*, v. 44, Nov. 1957, p. 769-778.

4697* Chromosome Breakage and Rejoining in Tradescantia Microspores. Alvin V. Beatty and Jeanne W. Beatty. *American Journal of Botany*, v. 44, Nov. 1957, p. 778-783.

At normal atmospheric pressures the O effect was found in the presence of CO. The CO effect is light reversible and acts in the presence of O only on the rejoining process.

4698* Venturia Inaequalis (CKE.) Wint. XIV. Nutritional Control of Pathogenicity of Certain Induced Biochemical Mutants. D. M. Kline, D. M. Boone, and G. W. Keitt. *American Journal of Botany*, v. 44, Nov. 1957, p. 797-803.

4699 Current Status of Therapy in Bacterial Endocarditis. Maxwell Finland. *American Medical Association, Journal*, v. 166, Jan. 25, 1958, p. 364-373.

4700 The Antineoplastic Action of Chemical Fractions of the Fruit of *Citrullus colocynthis* on Sarcoma-37. R. E. Faust, G. E. Cwalina, and E. Ramstad. *American Pharmaceutical Association, Journal (Scientific Ed.)*, v. 47, Jan. 1958, p. 1-5.

A potent tumor-damaging and toxic portion of the resin (F-2 fraction) eluted from a Florisil column does not prevent the "take" of Carcoma-37 when administered in small repeated doses, but does slightly retard its growth.

4701 The Synthesis and Aerosol Formulation of Certain Rare Earth Compounds as Potential Antiperspirants. Roger Mantsavinos and John E. Christian. *American Pharmaceutical Association, Journal (Scientific Ed.)*, v. 47, Jan. 1958, p. 29-31.

Two new potential anti-perspirant mixtures, a mixed rare earth methionate and a mixed rare earth sulfamate, were developed and studied for such properties as stability and solubility at various temperatures, vapor pressure, and corrosion.

4702 A Study of Dispersion With Ultrasound. I-II. Bernard Misek and Donald M. Skauen. *American Pharmaceutical Association, oJurnal (Scientific Ed.)*, v. 47, Jan. 1958, p. 32-39.

The extent of dispersion decreased as the viscosity of the suspending liquid increased. At lower temperatures, the temperature of the suspending liquid had no effect upon dispersion. Near the boiling point of the suspending liquid there was a considerable decrease in the extent of dispersion.

4703* Surfactant-Iodine Complexes as Germicides. Perry G. Bartlett and William Schmidt. *Applied Microbiology*, v. 5, Nov. 1957, p. 355-359.

The major part of the I remains free and titratable, but its properties are modified by the surfactant, that is, increased stability in dilute aqueous solutions, elimination of staining, and reduction of skin and eye irritation. Its applications in the field of sanitation are enhanced.

4704* Some Factors Influencing the Production of Certain Biosynthetic Penicillins. Hilda G. Macmorine. *Applied Microbiology*, v. 5, Nov. 1957, p. 386-391.

The proportions and amounts of penicillins X, G and *p*-aminobenzyl penicillin produced in fermentation liquors are markedly influenced by the ratio of volume of medium to volume of shake flask. An increase in the volume of medium was accompanied by an increase in penicillin X and a decrease in penicillin G under the conditions described. The highest yields of *p*-aminobenzyl penicillin were obtained in small volumes of medium.

4705* Flexible Film Apparatus for the Rearing and Use of Germfree Animals. P. C. Trexler and Louise I. Reynolds. *Applied Microbiology*, v. 5, Nov. 1957, p. 406-412.

The apparatus is used with steam sterilized supplies either by a direct connection to a steam sterilizer or by impervious packaging of steam sterilized supplies. A completely sealed plastic garment was sterilized with peracetic acid. One contamination resulting from failure of the garment occurred in 227 entries.

4706 Atomic Radiation. 110 p. 1957. RCA Service Co., Inc., Camden, N. J. (RA1231.R2 R21a Over.)

Theory, biological hazards, safety measures, and treatment of injury.

4707* The Use of Radioactive Isotopes in Immunological Investigations. XII. The Binding of a Hapten by Antibodies *in Vivo*. J. D. Hawkins. *Biochemical Journal*, v. 67, Dec. 1957, p. 537-540.

4708* Incorporation of Radioactive Amino Acids Into Proteins of the Microsome Fraction of Guinea-Pig Liver in a Cell-Free System. J. L. Simkin and T. S. Work. *Biochemical Journal*, v. 67, Dec. 1957, p. 617-624.

4709* Synthesis of Cellulose by *Acetobacter xylinum*. III. Substrates and Inhibitors. IV. Enzyme Systems Present in a Crude Extract of Glucose-Grown Cells. M. Schramm, Z. Gromet, and Shlomo Hestrin. *Biochemical Journal*, v. 67, Dec. 1957, p. 669-689.

Hexoses (glucose, fructose), three-carbon compounds (glycerol, dihydroxyacetone) and hexonates (gluconate, 2- and 5-oxogluconate) have been converted into cellulose by the action of washed cells of *Acetobacter xylinum*.

4710* (English.) **Studies on the Formation of Two- and Three-Stranded Polyribonucleotides.** Gary Felsenfeld and Alexander Rich. *Biochimica et Biophysica Acta*, v. 26, no. 3, Dec. 1957, p. 457-468.

Spectrophotometrical study by means of the continuous variation technique of the interaction of the synthetic polyribonucleotides, polyadenylic acid, and polyuridylic acid.

4711* (English.) **Interrelations Between Nucleic Acid and Protein Biosynthesis. I. Synthesis and Fate of Bacterial Nucleic Acids During Exposure to, and Recovery From the Action of Chloramphenicol.** Fred E. Hahn, Moselio Schaechter, Walter S. Ceglowski, Hope E. Hopps, and Jennie Ciak. *Biochimica et Biophysica Acta*, v. 26, no. 3, Dec. 1957, p. 469-476.

Cells of *E. coli* B/r, whose protein synthesis is inhibited by chloramphenicol, accumulate several times the amounts of intracellular nucleic acids contained in log-phase bacteria before the onset of chloramphenicol-induced bacteriostasis. Upon removal of the chloramphenicol the bacteria pass through a recovery phase during which much of the excess of nucleic acids is ejected from the cells before growth and multiplication are resumed. Conditions result from the imbalanced synthesis of normal nucleic acids under the influence of chloramphenicol rather than from the formation and elimination of abnormal polynucleotides.

4712* (English.) **Dependence of Protein Synthesis on Ribonucleic Acid Synthesis. II. Nonparticipation of Preformed Ribonucleic Acid in Protein Synthesis.** Ruth Ben-Ishai. *Biochimica et Biophysica Acta*, v. 26, no. 3, Dec. 1957, p. 477-483.

Systems were investigated in which RNA could be synthesized in the absence of protein formation and in which protein synthesis could subsequently be induced. The preformed RNA obtained participates neither in general protein synthesis nor in induced enzyme (β-galactosidase) formation. The present study leads to the conclusion that only the RNA formed simultaneously with protein participates in the synthesis of the protein.

4713* (French.) Effects *in vitro* of Ribonuclease on the Cells of the Bone Marrow and on the Cells of Landschütz Ascites Tumor. **Effets in vitro de la ribonuclease sur les cellules de la moelle osseuse et sur les cellules d'ascites du carcinome de landschutz.** A. Pileri, L. Ledoux, and F. Vanderhaeghe. *Biochimica et Biophysica Acta*, v. 26, no. 3, Dec 1957, p. 513-516.

Penetration of ribonuclease into cells of Landschutz ascites tumor, treated *in vitro*, is accompanied by an important elevation in the metabolism of the pyrimidine bases of RNA; the metabolism of the purine bases of RNA, and that of proteins, is not modified by this enzyme. Ribonuclease does not modify the metabolism of RNA or of proteins in the bone marrow cells, treated *in vitro*.

4714* (English.) **A Comparison of the Metabolism of Purines and Purine Analogs by Susceptible and Drug-Resistant Bacterial and Neoplastic Cells.** R. Wallace Brockman, M. Carolyn Sparks, and Marguerite S. Simpson. *Biochimica et Biophysica Acta*, v. 26, no. 3, Dec. 1957, p. 671-672.

4715* An Analysis of the Data for Some Experiments Carried Out by Gause With Populations of the Protozoa, *Paramecium aurelia* and *Paramecium caudatum*. P. H. Leslie. *Biometrika*, v. 44, Dec. 1957, p. 314-327.

Tests of some population growth theories.

4716* (Russian.) On the Oncological Characteristics of the Low-Tumorous CC-57-Brown Stock Mice. **K onkologicheskoi kharakteristike nizkorakovykh myshei CC-57-korichnevye.** N. N. Medvedev. *Biulleten' Moskovskogo Obshchestva Ispytatelei Prirody, Otdel Biologicheskii*, v. 62, no. 4, July-Aug. 1957, p. 63-67.

Low-tumorous stock mice CC-57-brown and CC-57-white were established from the F_1 hybrids in 1943 and they are in their 34-35 inbred generations. Both strains are free of the milk tumor

incitor, sensitive to the latter under definite experimental conditions, and widely used in work on cancer.

4717* Absorption of Iron as a Problem in Human Physiology. A Critical Review. Hugh W. Josephs. *Blood*, v. 13, Jan. 1958, p. 1-54.

4718* Tissue Mast Cell Leukemia. Ben I. Friedman, John J. Will, David G. Freiman, and Herbert Braunstein. *Blood*, v. 13, Jan. 1958, p. 70-78.

Possible association with urticaria pigmentosa and myeloid leukemia is considered.

4719* Radiation in the Production of Useful Mutations. Harold H. Smith. *Botanical Review*, v. 24, Jan. 1958, p. 2-24.

A review. 90 ref.

4720 Relative Reactivities of 1-Fluoro-2,4-Dinitro-Benzene and 2,4-Dichloro-6-(*o*-Chloroanilino)-*s*-Triazine With Metabolites Containing Various Functional Groups. H. P. Burchfield and Eleanor E. Stoors. *Boyce Thompson Institute, Contributions*, v. 19, Oct.-Dec. 1957, p. 169-176.

4721 The Sulfur Metabolism of Insects. II. The Metabolism of Cystine-S^{35} by the House Fly, Musca Domestica L. John D. Hilchey, Val F. Cotty, and S. Mark Henry. *Boyce Thompson Institute, Contributions*, v. 19, Oct.-Dec. 1957, p. 189-200.

Cystine-S^{35} fed to adult house flies was converted into taurine and sulfate.

4722 The Rearing of Aseptic Adult House Flies for Physiological Studies. S. Mark Henry and Val F. Cotty. *Boyce Thompson Institute, Contributions*, v. 19, Oct.-Dec. 1957, p. p. 227-229.

4723* The Chemotherapy of Malignant Disease. Ronald Bodley Scott. *British Medical Journal*, 1958, Jan. 4, p. 1-7.

Discussion of cytotoxic drugs and antimetabolites currently employed in chemotherapy of malignancies.

4724* Antithyroid Activity of N-Phthalyl Glutamic Acid Imide (K17). J. McC. Murdoch and G. D. Campbell. *British Medical Journal*, 1958, Jan. 11, p. 84-85.

N-Phthalyl glutamic acid imide has a mild but definite antithyroid activity when given in doses of 200 mg. or more. The mode of its action is unknown.

4725 The Metabolism of Animal Tissues Cultivated in Vitro. II. Amino Acid Metabolism of Chick Embryonic Kidney, Chick Embryonic Liver, and Monkey Kidney Cortex Cultures. Arthur E. Pasieka, Helen J. Morton, and Joseph F. Morgan. *Canadian Journal of Biochemistry and Physiology*, v. 36, Jan. 1958, p. 171-184.

Freshly-explanted cells have been cultivated *in vitro* in completely synthetic medium M 150. The amino acid changes in the medium are different with each type of tissue culture but all cultures examined removed adenine from the medium and liberated small amounts of material thought to be hypoxanthine.

4726 The Chemistry of Bacteria. VI. The Synthesis of a Trimethyl Derivative of the C_{20} Acid From Violacein. C. B. Barrett, R. J. S. Beer, G. M. Dodd, and Alexander Robertson. *Chemical Society, Journal*, 1957, Dec., p. 4810-4813.

4727 The Chemistry of Natural Products. v. I. The Alkaloids. K. W. Bentley. 237 p. 1957. Interscience Publishers, New York. (QD421 B44a)

An undergraduate reference work outlining the salient features of degradative and synthetic work on which the structures of representatives of the alkaloids are based.

4728* (French.) Polarographic Determination of Nicotine in Tobacco-Plants. **Détermination polarographique de la nicotine dans les tabacs de culture.** Paul Nangniot and Nasser Melamed. *Chimie Analytique*, v. 40, no. 1, Jan. 1958, p. 3-7.

A method of determination derived from the polarographic propotries of nicotine and nornicotine.

4729 Clinical Toxicology. The Clinical Diagnosis and Treatment of Poisoning. S. Locket. 772 p. 1957. Henry Kimpton, London. (RA1211 L79c)

A comprehensive text on identification and clinical treatment of poisoning.

4730* (Russian.) On the Mechanism of Interaction Between the Toxic Substances of Malignant Growths and Catalase. **K mekhanizmu vzaimodeistviia toksicheskikh veshchestv zlokachestvennykh opukholei s katalazoi.** I. A. Chudinova. *Doklady Akademii Nauk SSSR*, v. 116, no. 4, Oct. 1, 1957, p. 649-651.

From the direct reaction of the extract obtained from malignant growth and catalase it is concluded that accumulation of porphyrins in malignant organism could result from the action of catalase inhibitor on protoporphyrins.

4731* (Russian.) Some Features of Fluorescence of Aromatic Amino Acids. **Nekotorye Osobennosti fluorestsentsii aromaticheskikh aminokislot.** Iu. A. Vladimirov. *Doklady Akademii Nauk SSSR*, v. 116, no. 5, Oct. 11, 1957, p. 780-783.

Study of the possibility of the transfer of quantum energy from different donors to aromatic amino acids. Relative fluorescence intensity of amino acids in solutions or in the dry state. Fluorescence of mixed crystals of phenyl alanine and tryptophan.

4732* A Unique Reported Use for the Fruit of *Semecarpus anacardium* L. f. (Anacardiaceae) in Ancient Arabian and Indian Medicine. Lawrence J. King. *Economic Botany*, v. 11, July-Sept. 1957, p. 263-266.

The use of an extract of the whole or parts of the fruit of *Semecarpus anacardium* for disorders of the central nervous system is found in several old folk-medicine reports from India and Arabia.

4733* (Italian.) Investigations of the Structure of Proteins. **Indagini sulla struttura delle proteine. V.** Progressive Degradation of Polypeptidic Chains Starting From the N-Terminal Amino Acid. **Degradazione progressiva di catene polipeptidiche a partire dallo amminoacido N-terminale.** Luciano Scarso, Ernesto Scoffone, and Doroteo Chillemi. *Gazzetta Chimica Italiana*, v. 87, no. 12, Dec. 1957, p. 1348-1355.

N(2,4-dinitrophenyl) peptide was subjected to a selective reduction with $(NH_4)_2S$ at 37 C for 6 hr. Describes successful application to glycylglycine, glycyl-*d*, *l*-tryptophane, *l*-leucine peptides, and others.

4734* On the Esterolytic Activities of Papain and Trypsin. C. E. McDonald and A. K. Balls. *Journal of Biological Chemistry*, v. 229, Nov. 1957, p. 69-76.

The position of the substituent nitro group in the benzoyl moiety changes the sensitivity of the substrate to enzymatic hydrolysis.

4735 (French.) Photo-Restoration in Biology. **Photo-restauration en biologie.** Jules Duchesne and Julien Garsou. *Journal de Chimie Physique*, v. 54, no. 10, Oct. 1957, p. 789-791.

A new mechanism for interpreting the photo-restoration of cell lesions produced by ultra-violet radiation, based on internal conversion and on analogy to photo-chromatism. Limited effect of photo-restoration with X-rays was explained.

4736* Potassium and Sodium Movements in the Ehrlich Mouse Ascites Tumor Cell. H. G. Hempling. *Journal of General Physiology*, v. 41, Jan. 1958, p. 565-583.

Under conditions of low temperature with a diminished metabolism, net fluxes for the two ions are different.

4737* The Properties and the Enzymatic Degradation of Desoxyribonucleoprotein From Liver Cell Nuclei. Kenneth J. Monty and Alexander L. Douce. *Journal of General Physiology*, v. 41, Jan. 1958, p. 595-608.

The effects of X-rays, heat, and enzymes on the nucleoprotein are discussed, and the composition of the protein component is investigated.

4738* Biologic and Serologic Characteristics of Echo Viruses From West Virginia. Richard A. Ormsbee and Joseph L. Melnick. *Journal of Immunology*, v. 79, Nov. 1957, p. 384-391.

Characteristics of 30 viruses were described. This group has been characterized as human enteric viruses.

4739* Phagocytosis of Influenza Virus. I. *In Vitro* Observations. II. Its Occurrence in Normal and Immune Mice. Robert J. Hanson, J. E. Kempf, and Arthur V. Boand, Jr. *Journal of Immunology*, v. 79, Nov. 1957, p. 416-427.

From data obtained by the fluorescent antibody technique, it appeared that the influenza virus could be phagocytosed by human and rabbit leucocytes *in vitro*.

4740* The Submerged Culture of Mammalian Cells. The Spinner Culture. William F. McLimans, Eldon V. Davis, Fletcher L. Glover, and Geoffrey W. Rake. *Journal of Immunology*, v. 79, Nov. 1957, p. 428-433.

Actively proliferating mammalian cell suspensions in volumes of 25 to 400 ml. have been established utilizing the prototype "L" cell.

4741* Human Plasmapheresis and Its Effect on Antibodies. Joseph Smolens, Joseph Stokes, Jr., and Agnes B. Vogt. *Journal of Immunology*, v. 79, Nov. 1957, p. 434-439.

Results on the biweekly plasmapheresis for 1 yr. on each of 23 donors have demonstrated the safety and feasibility of the method utilizing the ADL-Cohn fractionator.

4742 Mycological Formation of Fat. IV. The Component Fatty Acids of the Fat Produced by *Penicillium soppii* Zal. J. Singh, Sudha E. Philip, and T. K. Walker. *Journal of the Science of Food and Agriculture*, v. 8, Dec. 1957, p. 697-701.

A surface culture on a medium containing sucrose and mineral salts produces fat with a very low content of free acid (O·6% as oleic acid).

4743* The Estimation of Physiologically Active, Naturally Occurring Substances in the Tissues and Body Fluids: Acetylcholine, L-Adrenaline, Lnoradrenaline, Histamine, Serotonin and Substance P. VI. J. J. Lewis and N. G. Waton. *Laboratory Practice*, v. 7, Jan. 1958, p. 27-29.

4744* Hypertension Following X-Irradiation of the Kidneys. Clifford Wilson, J. M. Ledingham, and M. Cohen. *Lancet*, v. 1, Jan. 4, 1958, p. 9-16.

Observations in man and experiments in rats show that X-irradiation of the kidneys may produce interstitial fibrosis and hypertension. These appear to be independent of one another.

4745* Regulation of Body Temperature in Health and Disease. George Pickering. *Lancet*, v. 1, Jan. 11, 1958, p. 59-64.

Considers fever resulting from a disturbance in the body's temperature regulating mechanism.

4746 The Lipids. v. III. Biochemistry. Harry J. Deuel, Jr. 1065 p. 1957. Interscience Publishers, New York. (QP751 D48L)

A comprehensive review of lipid research covering biosynthesis, oxidation, metabolism, and nutritional value.

4747 Morphine & Allied Drugs. A. K. Reynolds and Lowell O. Randall. 393 p. 1957. University of Toronto Press. (RM666.M8 R33m)

A monograph on the pharmacology of morphine, its related alkaloids, derivatives, and newer substitutes.

4748 Metabolism of Pyruvate and α-Ketoglutarate in Virus-Infected Mouse Brain. P. L. Bradley. *Nature*, v. 180, Dec. 21, 1957, p. 1418-1419.

4749 Induction of Mouse Leukaemia With Purified Nucleic Acid Preparations. Esther F. Hays, Norman S. Simmons, and William S. Beck. *Nature*, v. 180, Dec. 21, 1957, p. 1419-1420.

A series of experiments in which the incidence of leukemia was apparently increased in a hybrid strain by injection into newborn mice of purified nucleic acid prepared from the lymphoid tissues of a high-leukemia donor strain is described.

4750 Rapid Sedimentation of Proteins Through Starch. N. G. Anderson. *Nature*, v. 181, Jan. 4, 1958, p. 45-46.

Packed potato starch has certain advantages as a supporting medium in the ultracentrifuge. Boundaries are stabilized and the proteins thus far studied sediment at least twice as rapidly in starch as in free solution.

4751 The Anionic Polyelectrolyte, Polyethylene Sulphonate, as a New Anti-Neoplastic Agent. *Nature*, v. 181, Jan. 4, 1958, p. 46-47.

Polyethylene sulfonate, a polymer with many properties similar to heparin, has produced inhibition of growth in seven transplanted mouse tumors. Anionic polyelectrolytes may represent a new class of anti-neoplastic agents.

4752 Inhibiting Effect of Chlorpromazine on the Experimental Production of Liver Cancer. K. Fujita. S. Iwase, T. Ito, and M. Matsuyama. *Nature*, v. 181, Jan. 4, 1958, p. 54.

The inhibitory effect of the drug for carcinogenesis induced by 4-dimethyl-aminoazobenzene may be due to th delay in transition from the precancerous to the cancerous stages.

4753* New Developments in Terpene Chemistry From Vitamin A to Linalool. Philip E. Chaleyer. *Perfumery and Essential Oil Record*, v. 49, Jan. 1958, p. 17-20.

4754* A Study of Tobacco Mosaic Virus Strain Predominance and an Hypothesis for the Origin of Systemic Virus Infection. Morris Cohen, et al. *Phytopathology*, v. 47, Dec. 1957, p. 694-702.

4755* Pathogenic, Cultural, and Physiological Variation Within Phytophthora parasitica Var. nicotianae. J. L. Apple. *Phytopathology*, v. 47, Dec. 1957, p. 733-740.

By a greenhouse seedling inoculation technique, it was found that isolates of the black shank fungus varied from a low level of pathogenicity on a susceptible tobacco variety to a high level of pathogenicity on resistant varieties.

4756* The Effect of Mineral Salts on Local-Lesion Formation by Phaseolus vulgarus Inoculated With Tobacco Mosaic Virus. James D. Panzer. *Phytopathology*, v. 47, Dec. 1957, p. 748-751.

4757* Neural Mechanisms in Perception. Jerome S. Bruner. *Psychological Review*, v. 64, pt. 1, Nov. 1957, p. 340-358.

Presents a model in which there is a de-emphasis on transmission of impulses across synaptic segments and a shift in emphasis to integration and autogenic activity, a model including complex networks with the capacity to hold up and to alter the characteristics of impulses transmitted to them, and with the capacity to initiate activity.

4758* Some Acute Effects of *D*-Lysergic Acid Diethylamide on the Rat. Peter H. Glow. *Quarterly Journal of Experimental Psychology*, v. 9, Nov. 1957, p. 206-214.

Investigates the possibility of relating the behavioral disturbances induced by LSD-25 to known physiological data. Variation in the latency and running times of trained albino rats is examined. Shows that latency scores are directly affected by the cerebral concentration of the drug and sensory thresholds appear to be raised.

4759* Experimental Foundations of the Concept of Metal-Flavoprotein Catalysis. Thomas P. Singer and Vincent Massey. *Record of Chemical Progress*, v. 18, no. 4, Dec. 1957, p. 201-244.

The metal flavoproteins and the postulated function of metals in them. The role of enzymes.

4760* Physical Limitations of the Rapid Freezing Method. H. T. Meryman. *Royal Society, Proceedings*, v. 147, ser. B, Dec. 17, 1957, p. 452-459 + 2 plates.

Primarily a discussion of slow and rapid freezing from which the limitations of the rapid method are self evident.

4761* Factors Affecting the Viability of Erythrocytes Stored in the Frozen State. N. C. H. Jones, P. L. Mollison, and Margaret A. Robinson. *Royal Society, Proceedings*, v. 147, ser. B, Dec. 17, 1957, p. 476-497.

The post-transfusion survival of human red cells stored in a glycerol-citrate-phosphate medium at −20 C.

4762* Fibre Formation by Cellular Systems. E. J. Ambrose. *Royal Society, Proceedings*, v. 148, ser. B, Jan. 1, 1958, p. 57-67 + 5 plates.

In order to study possible mechanisms of fibrogenesis within living cells, experiments were carried out using solutions of nucleo-proteins to determine the conditions which lead to the building up of spontaneously ordered structures. Nucleo-protein

solutions which separate into a two-phase system produce orientated fibers by a process of aggregation.

4763* The Precancerous Liver; Correlations of Histological and Biochemical Changes in Rats During Prolonged Administration of Thioacetamide and "Butter Yellow". Helen C. Grant and K. R. Rees. *Royal Society, Proceedings,* v. 148, ser. B, Jan. 1, 1958, p. 117-136.

4764 Production of Reversible Changes in the Central Nervous System by Ultrasound. F. J. Fry, H. W. Ades, and W. J. Fry. *Science,* v. 127, Jan. 10, 1958, p. 83-84.

4765 Induction of Neural Tissue in Ventral Explants From Frog Gastrulae by Carbon Dioxide Shock. Reed A. Flickinger. *Science,* v. 127, Jan. 17, 1958, p. 145-146.

Neuroid tissue and parts of the brain were frequently noted in explants that had received CO_2 shocks. Less frequently, muscle, nephric tubules, and notochord were present in the explants.

4766 Action of Hydrocortisone on Respiration and Aerobic Glycolysis of Cultured Cells. Henry Grossfeld. *Science,* v. 127, Jan. 17, 1958, p. 148-150.

Hydrocortisone caused inhibition of respiration which was coupled with significant increase of aerobic glycolysis.

4767 Concentration of Cesium-137 by Algae. L. G. Williams and H. D. Swanson. *Science,* v. 127, Jan. 24, 1958, p. 187-188.

4768* Effect of a Histamine Releaser (48/80 Upon Development of Walker Tumor. Gaëtan Jasmin. *Society for Experimental Biology and Medicine, Proceedings,* v. 96, Dec. 1957, p. 570-572.

Growth of Walker Tumor 256 is increased in rats receiving compound 48/80 in progressive dosage. This is significant only in animals pretreated with the histamine releaser.

4769* Beneficial Effect of Quinoxaline 1,4-di-N-Oxide in Radiation Injury in Mice. Thomas J. Haley, Anna M. Flesher, R. Veomett, and J. Vincent. *Society for Experimental Biology and Medicine, Proceedings,* v. 96, Dec. 1957, p. 579-582.

Premedication with Quinoxaline1,4-di-N-oxide significantly increases both the ST_{50} day and total number of survivors. There is a significant reduction in number of enteric organisms causing the usual irradiation bacteremia.

4770* Serum Properdin Levels and Cancer Cell Homografts in Man. Chester M. Southam and Louis Pillemer. *Society for Experimental Biology and Medicine, Proceedings,* v. 96, Dec. 1957, p. 596-601.

Low levels of serum properdin were found in patients with advanced cancer whose ability to reject cancer cell homografts was defective. Normal levels were observed in normal persons who rejected homografts promptly.

4771* Inhibition of Azo Dye Carcinogenesis by Adrenalectomy and Treatment With Desoxycorticosterone Trimethylacetate. W. J. Eversole. *Society for Experimental Biology and Medicine, Proceedings,* v. 96, Dec. 1957, p. 643-646.

4772* Modification of Antibody Response in X-Irradiated Rats by Injection of Spleen Homogenates. Mariano F. La Via, Melba Robson, and Robert W. Wissler. *Society for Experimental Biology and Medicine, Proceedings,* v. 96, Dec. 1957, p. 667-670.

Antibody formation, inhibited by 500 r of total body X-irradiation into the rat, can be restored partially by spleen homogenates injected soon after irradiation.

4773* Metabolism of Dihydro Streptomycin Sensitive, Resistant and Dependent *Vibrio comma*. Hannah Farkas-Himsley. *Society for Experimental Biology and Medicine, Proceedings,* v. 96, Dec. 1957, p. 698-701.

Nitrate reductase is inactive in non-proliferating resistant and dependent cells and their extracts. Oxygen uptake in the presence of glucose, pyruvate, succinate, malate, oxaloacetate, α-ketoglutarate and fumarate substrates was inhibited in resistant and dependent mutants.

4774* Thymus Specificity in Lethally Irradiated Mice Treated With Rat Bone Marrow. N. Gengozian, I. S. Urso, C. C. Congdon, A. D. Conger, and T. Makinodan. *Society for Experimental Biology and Medicine, Proceedings,* v. 96, Dec. 1957, p. 714-720.

Thymuses of mice protected with rat bone marrow are repopulated by rat-type cells.

4775* Biochemical Changes in HeLa Cells Associated With Infection by Type 2 Adenovirus. Hilton B. Levy, Wallace P. Rowe, LeRoy F. Snellbaker, and Janet W. Hartley. *Society for Experimental Biology and Medicine, Proceedings,* v. 96, Dec. 1957, p. 732-738.

Infection produced a rapid and prolonged uptake of inorganic P^{32} and glycine-2-C^{14}, with no change in concentration of P, RNA, or DNA. Increased lactic acid was not observed until 8 to 24 hrs. after infection.

4776* Relationship Between Penicillin Susceptibility and Virulence of *Staphylococcus aureus*. Daniel Amsterdam and S. Stanley Schneierson. *Society for Experimental Biology and Medicine, Proceedings,* v. 96, Dec. 1957, p. 750-752.

A higher proportion of resistant strains were virulent, as compared to sensitive strains which were fairly evenly divided between virulent and avirulent strains.

4777* Immunogenicity of Particles Isolated From *Mycobacterium tuberculosis*. Anne S. Youmans, Guy P. Youmans, and Irving Millman. *Society for Experimental Biology and Medicine, Proceedings,* v. 96, Dec. 1957, p. 762-768.

Highly immunogenic particles, obtained from ground extracts, were just as effective as the living whole cells in protecting mice against a severe infection.

4778* Isolation of Nutritional Variants From Conjunctival and HeLa Cells. R. Shihman Chang. *Society for Experimental Biology and Medicine, Proceedings,* v. 96, Dec. 1957, p. 818-820.

A method is described for isolation and maintenance of variants using d(+)xylose, d-ribose, or sodium lactate as the sole source of added carbohydrate.

4779 The Species Problem. Ernst Mayr, editor. 395 p. 1957. American Association for the Advancement of Science, Washington, D. C. (QH367 Am35s)

A collection of eight papers dealing with the problems of concept and definition of species. Experimental work is cited from a number of fields of biology and paleontology.

4780* (English.) **Biochemistry of Nitrate Reduction.** Fujio Egami. *Svensk Kemisk Tidskrift,* v. 69, no. 12, 1957, p. 562-569.

Nitrate reduction provides N necessary for the synthesis of nitrogenous cell constituents and for formation of high-energy phosphate bonds. Quite different enzyme systems exist for nitrate reduction corresponding to the different physiological purposes.

4781 Molecular Interactions in Irradiated Solids. Amos Norman and William Ginoza. *University of California at Los Angeles, School of Medicine (U. S. Atomic Energy Commission),* UCLA 418, Dec. 1957, 14 p. (UF767 Un3.1uc Contin.)

Evidence for molecular interactions in irradiated solids was found both in electron paramagnetic resonance spectra of various X-irradiated molecular mixtures and in increased radiation resistance of catalase induced by glutathione.

See also: **4652** (effects of space environment on humans); **4825** (antibiotic production); **4963** (hypotensive agents); **4989** (synthesis of antirachitic vitamins); **4991** (7-keto steroids as anti-cortisones); **4992** (steroidal hormone analyogs); **4998** (possible antimetabolites); **5003** (phosphopeptone amino acid from β-casein); **5157** (macromolecular behavior in aqueous ionic fields); **5313** (medical electronics); **5318** (digestive tract telemeters); **5414** (kinetics of bacterial inactivation by heat); **5529** (specimen examination in light and electron microscopes); **5619** (bacteriostasis in metal protection); **5758** (microbial oxidation of soluble oils); **5971** (fluorescence spectra of proteins); **6041** (gamma-radiation and cellulose); **6073** (polyvinylpyrrolidone blood substitute); **6081** (aeration and biological sewage treatment); **6090** (sludge digestion and

methane fermentation); **6093** (redox potentials in sludge digestion); **6095** (bacteriology of *Hevea* latex); **6119** (freeze-drying and proteins in bovine hide).

CERAMICS AND CONCRETE

4782 Some Missile Design Requirements for Ceramic Radomes. G. D. Robertson. *American Ceramic Society Bulletin*, v. 37, Jan. 1958, p. 1-3.

Some thermal, electrical, mechanical, and practical requirements of radomes are discussed with emphasis on the effects of aerodynamic heating.

4783 An Experimental Cone Series Designed for Use in Pottery Decorating Kilns and Enameling Furnaces. L. E. Shipley. *American Ceramic Society Bulletin*, v. 37, Jan. 1958, p. 9-11.

The temperature interval between members of the series is uniformly 10 C, ± 2 C, when fired to deformation on a standard schedule.

4784 Eelectric Kilns in the Ceramic Industry. Rudolf Buchkremer. *American Ceramic Society Bulletin*, v. 37, Jan. 1958, p. 27-32.

The various stages of firing and the firing temperature ranges from metallic lusters to hard porcelain. Economic considerations of periodic and tunnel kilns.

4785 Elasticity, Strength, and Other Related Properties of Some Refractory Castables. S. J. Schneider and L. E. Mong. *American Ceramic Society, Journal*, v. 41, Jan. 1958, p. 27-32.

Young's modulus of elasticity, transverse strength, extensibility, and load resistance were determined on six groups of laboratory-prepared refractory castables which had no heat treatment and heat treatment at 1050 and 1300 C.

4786* Failures of Concrete Structures. Jacob Feld. *American Concrete Institute, Journal*, v. 29, Dec. 1957, p. 449-470; *ACI Proceedings*, v. 54, 1957, p. 449-470.

A historical survey of concrete failures of the last half century in the U. S. grouped according to their major causes: design deficiency, drafting and detailing errors, concrete mix, supervision omission, frost protection defects, bearing wall deficiency, foundation deficiency, faulty erection techniques, temperature and shrinkage, secondary stresses, and inadequate formwork.

4787* Long-Time Study of Cement Performance in Concrete. X. Progress Report on Strength and Elastic Properties of Concrete. Paul Klieger. *American Concrete Institute, Journal*, v. 29, Dec. 1957, p. 481-504; *ACI Proceedings*, v. 54, 1957, p. 481-504.

Presents 3-year strength data for laboratory mortar and concrete specimens.

4788* (German.) Equilibrium Tests Within the Systems Zirconium Oxide and Calcium Oxide With Iron Oxides. **Gleichgewichtsuntersuchungen in den Systemen des Zirkonoxyds und Kalziumoxyds mit Eisenoxyden.** Wilhelm A. Fischer and Alfred Hoffmann. *Archiv für das Eisenhüttenwesen*, v. 28, no. 12, Dec. 1957, p. 771-776.

The solubility of iron oxides in CaO-ZrO_2-fluorite phases was tested, and the binary system ZrO-CaO rechecked at 1450 C.

4789 (German.) Effect of the Surface Tension of Melting Silicates on the Attack of Refractory Material. **Der Einfluss der Oberflächenspannung schmelzender Silikate auf den Angriff feuerfester Baustoffe.** H. Lehmann and U. S. Singh. *Berichte der Deutschen Keramischen Gesellschaft*, v. 34, no. 11, Nov. 1957, p. 353-362.

Theoretical consideration of the solid-liquid interfacial reaction. Experimental determination of the relationship between contact angle, surface tension, adhesion, attack of the melt, and refractories. X-ray examination. Use of "Vanal".

4790* Hydrogen-Protected Wire-Wound Resistance Furnaces. I. Louis Navias. *Ceramics*, v. 9, Jan. 1958, p. 23-28.

Comparative tests show large differences in relative thermal conductivity among alumina insulating powders and granules. Zirconia powder is a better thermal insulator than Al_2O_3 powder. The poor electrical resistivity of ZrO_2 at high temperatures limits its use in wire-wound furnaces. (To be continued.)

4791* (Russian.) The Effect of Cesium in Silicate Glass on the Refraction of Light. **Vliianie tseziia na svetopreломlenie silikatnykh stekol.** M. A. Bezborodov and N. M. Bobkova. *Doklady Akademii Nauk SSSR*, v. 116, no. 4, Oct. 1, 1957, p. 652-655.

The Cs_2O-SiO_2, Cs_2O-CaO-SiO_2, and Cs_2O-Na_2O-Al_2O_3-SiO_2 systems were studied. It was found that refraction of light increases with the increase of Cs_2O content, and that the three-component Cs glass has higher refraction than corresponding Li, K, and Na glasses of equal molecular composition.

4792* (German.) The Resistance to Sudden Changes of Temperature of Porous Ceramic Material in the Sphere of Electrical Engineering. **Die Temperaturwechselbeständigkeit poröser keramischer Isolierstoffe für die Elektrotechnik.** K. Backhaus. *Elektrowärme*, v. 15, Dec. 1957, p. 411-415.

Comparative figures for the porous ceramic insulating materials belonging to group 500/DIN 40685 were found at 155 to 560 C at sudden cooling and 260 to 785 C at sudden heating. The ratio of the heating comparative figure to the cooling comparative figure was from 1.4 to 1.7 for various materials.

4793 Spectra of Simple Glasses in the Infrared Range and Their Relations to the Structure of Glass. V. A. Florinskaya and R. S. Pechenkina. *Glass Industry*, v. 39, Jan. 1958, p. 27-31. (Translated from the Russian by Wilhelm Eitel).

4794 (German.) Hyperfine Structure Dispersion of the Paramagnetic Resonance of Pr^{3+} in Ceramic $LaAlO_3$. **Hyperfeinaufspaltung der paramagnetischen Resonanz von Pr^{3+} in keramischem $LaAlO_3$.** H. Gränicher, K. Hübner, and K. A. Müller. *Helvetica Physica Acta*, v. 30, no. 6, 1957, p. 480-483.

A study of the paramagnetic resonance spectrum of trivalent Pr ions in ceramic $LaAlO_3$ with a 3.2 cm. wave length at 4.2 K. The molecular concentration of the Pr ions was from 10^{-3} to $3 \cdot 10^{-3}$.

4795 Pitch Binder Coke Yields. S. W. Martin and H. W. Nelson. *Industrial and Engineering Chemistry*, v. 50, Jan. 1958, p. 33-40.

Coking values for binder pitches used for manufacture of carbon electrodes and anodes have usually been determined with little reference to commercial baking practices. A new method simulates conditions in large-scale operations and can accurately predict behavior of these pitches.

4796 Microstructures of Carbon Products. S. W. Martin and F. L. Shea, Jr. *Industrial and Engineering Chemistry*, v. 50, Jan. 1958, p. 41-46.

Equipment, method of selecting samples, and technique required to obtain polished sections of amorphous industrial carbons, graphites, and coke.

4797* (French.) The Grinding of Samples in Ceramic Analysis. **Le broyage des échantillons d'analyse.** P. Draignaud. *Industrie Céramique*, 1957, no. 492, Dec., p. 343-349.

Preparation of samples, nature of materials. Duration of the grinding process, different types of grinding equipment. Impurities resulting from grinding.

4798 Silicon Nitride Refractory. T. F. Frangos. *Materials in Design Engineering*, v. 47, Jan. 1958, p. 115-117.

Material features high temperature stability, resistance to molten nonferrous metals, and good thermal shock resistance.

4799 Castable Refractories. A. E. Williams. *Metal Industry*, v. 92, Jan. 3, 1958, p. 3-7.

Properties of aluminous cement. Applications in thermal insulation, furnace construction, and foundry floors.

4800* (Russian.) Carbon Lining for Troughs for Molten Steel. **Stalevypusknye zheloba iz uglerodistoi massy.** M. A. Kamenskii, L. M. Pokrass, and D. S. Gerchikov. *Metallurg*, v. 2, no. 12, Dec. 1957, p. 17-19.

Preparation and composition of the carbon mass. Method of lining. Diagram of wear of trough lining. Results of mechanical tests; practical and economical advantages.

4801 Preparation and Metallography of Arc-Melted Uranium Carbides. R. J. Gray, W. C. Thurber, and C. K. H. DuBose. *Oak Ridge National Laboratory (U. S. Atomic Energy Commission),* ORNL-2446, Jan. 1958, 21 p. (UF767 U3o Contin.)

Preparation of massive uranium carbides of various C contents by arc melting; techniques for preparing and polishing metallographic specimens, analysis of the microstructure.

4802* (Russian.) Refractory Spouts for Continuous Casting of Killed Carbon Steel. **Ogneupornye stakany dlia nepreryvnoi razlivki spokoinoi uglerodistoi stali.** V. M. Strelets, A. G. Karaulov, and I. S. Zozulia. *Ogneupory,* v. 22, no. 11, 1957, p. 483-492.

Diagrams of continuous steel casting installations. Various refractory spouts (chamotte, argillo-graphite, and two-component spouts), their composition, production, and properties.

4803* (Russian.) In-Fired Chrome-Magnesite Bricks for Lining the Side Walls of Medium Capacity Open-Hearth Furnaces. **Bezobzhigovyi khromomagnezitovyi kirpich dlia tortsovykh sten martenovskikh pechei srednei emkosti.** V. A. Rybnikov, M. S. Pilipenko, and E. F. Solomonov. *Ogneupory,* v. 22, no. 11, 1957, p. 492-496.

Testing of bricks; their preparation, chemical composition, and properties. Comparison of results with fired bricks.

4804* (Russian.) Plasticized Chamotte and High-Alumina Mortars. **Plastifitsirovannye shamotnye i vysokoglinozemistye merteli.** L. A. Tseitlin and V. P. Rakina. *Ogneupory,* v. 22, no. 11, 1957, p. 513-519.

Chemical composition and refractoriness of initial materials and of various types of mortars. Effect of additives on mortar properties. Firing behavior and gas permeability of mortars.

4805* (Russian.) Heat Resistant High Alumina Ladle Brick and Stop Valves Made From Mullite-Corundum Material **Termostoikii vysokoglinozemistyi kovshevoi kirpich i stopornye trubki mullito-korundovogo sostava.** D. S. Rutman, L. V. Vinogradova, K. A. Krasotin, and D. B. Min'kov. *Ogneupory,* v. 22, no. 12, 1957, p. 546-549.

Chemical composition, heat resistance and physical properties. Life of ladle and stop valves.

4806* (Russian.) Wear of Refractory Material in Various Zones of Blast Furnace. **Iznos ogneuporov v razlichniykh zonakh domennoi pechi.** O. M. Margulis and E. A. Giniar. *Ogneupory,* v. 22, no. 12, 1957, p. 549-556.

Suggestion for the improvement of the shape and composition of blast furnace lining bricks.

4807* (Russian.) Impregnation of Silicon Carbide Articles With Metals. **Propitka metallami izdelii iz karbida kremniia.** A. N. Novikov. *Ogneupory,* v. 22, no. 12, 1957, p. 557-562.

A process of impregnation in the gas phase. The most suitable metals for impregnation are Si, Al, and B.

4808 Now—Ceramics That Bounce. R. H. Rudolph. *Product Engineering,* v. 29, Feb. 3, 1958, p. 76.

When rectangular helical grooves are machined in a cylinder of fired alumina frit, the result is a synthetic-sapphire spring with good elastic properties up to 1800 F. This method for producing helix has been economically applied to diameters from about 1 to 4½ in., with square "wire" sections from 1/16 to ¼ in.

4809* (Polish.) Effect of Mineralizers on the Decomposition of Calcium Sulfate by the Clinker Method. **Wpływ mineralizatorów na rozkład siarczanu wapnia metoda klinkrowa.** S. Weychert and J. Milewski. *Przemysł Chemiczny,* v. 13, no. 12, Dec. 1957, p. 690-696.

Studies at 800 to 1200 C with 0.25 to 3% mineralizer content. Different velocities of decomposition according to various activators, such as CaF_2, clay glass Na_2SO_4, NaCl, or $CaCl_2$.

4810* (German.) The Service Life of Rotary Cement Kiln Linings. **Gesichtspunkte zur Haltbarkeit des Futters in Zementdrehöfen.** B. Nikander. *Radex Rundschau,* 1957, no. 7, Dec., p. 861-867.

Effect of high temperatures and temperature fluctuations; chemical effects.

4811 Linings for Hot Metal Mixers. F. H. McRitchie. *Refractories Institute, Technical Bulletin No.* 98, Nov. 1957, 12 p. (TN677 R24.7t Contin.)

Discusses design and service factors affecting the life of hot metal mixer and car linings; gives reasons to show why simple comparisons can be quite misleading.

4812* (French.) Effect of a Fall in Temperature on Cement Hardening, Especially Slag-Based Cements. **Influence de l'abaissement de la température sur le durcissement des ciments.** Léon Blondiau. *Revue des Matériaux de Construction,* C, 1957, no. 506, Nov., p. 327-331.

Effect of the grain size of Portland cement. Variation of the hydration heat as function of the Blaine size. Effect of the clinker contents of blast-furnace cements. (To be continued.)

4813* (French.) The Advantage of Control and Its Application to Ceramic Production. **L'intérêt du contrôle et son application dans la fabrication des produits céramiques.** A. Baudran. *Silicates Industriels,* v. 22, no. 12, Dec. 1957, p. 668-674.

A study of control in the ceramic industry applied to raw material, products being made, finished products, and output.

4814* (French.) Rheology in the Cement Industry. **La rhéologie dans l'industrie cimentière.** Michel Papadakis. *Silicates Industriels,* v. 22, no. 12, Dec. 1957, p. 675-681.

Study of thixotropy and application to cement suspensions. Rheological coefficients as a function of water content. Effect of clay additions.

4815* (Finnish.) **On the Physical Chemistry of Concrete.** Tenho Sneck. *Teknillisen Kemian Aikakauslehti,* v. 14, Nov. 15, 1957, p. 499 + 2 pages.

Some functions and properties of concrete materials; cement, water, and aggregates; the cement-water system; concrete deterioration.

4816* (German.) Determining Stress in Concrete by Measuring Its Expansion. **Spannungsermittlung an Beton durch Dehnungsmessungen.** Gustav Weil. *VDI Zeitschrift,* v. 99, no. 36, Dec. 1957, p. 1781-1786.

Composition of concrete and effect on compactness and elasticity. Effect of aging and setting conditions. Its behavior under load. Applications of expansion measurements.

4817* (French.) Some Technical Aspects in the Forming of Sheet Glass by Drawing. **Sur quelques aspects techniques de la fabrication du verre en feuilles par étirage.** Bernard Long. *Verres et Réfractaires,* v. 11, no. 5, Sept.-Oct. 1957, p. 281-286.

Problems studied were: bubble formation in the glass bath after refining; surface irregularities caused by internal thermal irregularities; increase of the rate of production of a sheet of a given thickness.

See also: **4902** (silicate analysis); **4949** (high temperature ceramic chemistry); **5261** (porcelain insulators); **5575** (thermal shock and fatigue); **5626** (oxidation of TiB_2 and CbB_2); **5791** (abrasive belt performance factors); **6141** (bonding ceramics to metals).

CHEMICAL ENGINEERING

4818* (German.) Chlorine Liquefaction by Low Temperature Cooling. **Chlorverflüssigung durch Tiefkühlung.** K. Nürmberger and H. Kubli. *Allgemeine Wärmetechnik; Zeitschrift für Wärme-Kälte- und Verfahrenstechnik,* v. 8, no. 4, 1957, p. 87-90.

Definition and calculation of Cl liquefaction. Relationship between Cl content and total pressure of initial mixture, Cl temperature at end of process, and yield in liquid Cl. Description of apparatus.

4819 Reaction of Porous Solids. E. E. Petersen. *A. I. Ch. E. Journal,* v. 3, Dec. 1957, p. 443-448.

A method for analysis of reaction between a porous solid and a gaseous reactant where the kinetic expression is linear in concentration and where appreciable concentration gradients are established in the pore system as a result of diffusive transport rate.

4820 Kinetics of Aledhyde Hydrogenation: Vapor-Phase Flow System and Supported Nickel Catalyst. C. C. Oldenburg and Howard F. Rase. *A. I. Ch. E. Journal*, v. 3, Dec. 1957, p. 462-466.

A kinetic study of the catalytic vapor-phase hydrogenation of acetaldehyde, propionaldehyde, and *n*-butyraldehyde was made at low conversions with a commercial supported Ni catalyst.

4821 Continuous-Flow-Stirred Tank Reactors: Solid-Liquid Systems. R. V. Mattern, Olegh Bilous, and Edgar L. Piret. *A. I. Ch. E. Journal*, v. 3, Dec. 1957, p. 497-505

Concerns the elementary process occurring when solid particles and a liquid flow into and from a single reactor or a chain of these reactors. Equations are developed for dissolution processes.

4822 Unsteady State Heat Transfer in Stationary Packed Beds. Park M. Reilly. *A. I. Ch. E. Journal*, v. 3, Dec. 1957, p. 513-516.

A new solution is presented of the differential equations describing unsteady state heat transfer in stationary beds of small granular solid particles through which a fluid is flowing.

4823 Hydroextraction: Flow in Submerged Cakes. J. Anderson Storrow. *A. I. Ch. E. Journal*, v. 3, Dec. 1957, p. 528-534.

Flow equations are proposed. These equations have been confirmed for the effect of each variable by use of different techniques.

4824* (German.) Extraction of Crude Benzene in the Last Gas-Pressure Stage of the Coking Plant. **Rohbenzolgewinnung in der Ferngasdruckstufe der Kokerei.** Theodor Haber. *Brennstoff-Chemie*, v. 38, nos. 23-24, Dec. 1957, p. 366-371.

A survey of different extraction methods.

4825* The Production of Antibiotics. G. Ross. *British Chemical Engineering*, v. 3, Jan. 1958, p. 8-13.

Culture methods; submerged fermentation process; sterilization techniques; design of fermentation vessels; extraction and purification.

4826* Design of Sieve-Type Distillation Plates. H. E. Eduljee. *British Chemical Engineering*, v. 3, Jan. 1958, p. 14-17.

Size and number of holes; minimum vapor rate; froth height; pressure drop through plate; plate efficiency; design.

4827 Catalysis in Practice. C. H. Collier, editor. 153 p. 1957. Reinhold Publishing Corp., New York. (TP156.C35 C69c)

Commercial preparation of industrial catalysts; fixed bed catalyst systems; moving bed processes; operating problems in catalytic processing.

4828 Selecting Ejectors for High Vacuum. C. G. Linck. *Chemical Engineering*, v. 65, Jan. 1958, p. 145-150.

Uses of high vacuum techniques; data on steam and water requirements, equipment costs, and performance characteristics for steam ejectors having four or more stages.

4829 Temperature vs. Heat of Vaporization. Wallace R. Gambill. *Chemical Engineering*, v. 65, Jan. 1958, p. 159-162.

Reliable methods to stretch out meager data on latent heat of phase change.

4830* On the Instability and Inhomogeneity of Filter-Cakes. P. M. Heertjes and J. Nijman. *Chemical Engineering Science*, v. 7, nos. 1-2, 1957, p. 15-25 + 1 plate.

Proves that cakes formed by filtration or by sedimentation in planes perpendicular to the direction of flow are not homogeneous.

4831* Absorption of Carbon Dioxide in Water Under Pressure Using a Gas-Bubble Column. G. Houghton, A. M. McLean, and P. D. Ritchie. *Chemical Engineering Science*, v. 7, nos. 1-2, 1957, p. 26-39.

A bubble-type water scrubber was studied with special reference to the absorption of large quantities of CO_2 from gas mixtures consisting mainly of this substance. The effect of various operating variables was determined.

4832* Mechanism of Formation of Gas Bubble-Beds. G. Houghton, A. M. McLean, and P. D. Ritchie. *Chemical Engineering Science*, v. 7, nos. 1-2, 1957, p. 40-50 + 1 plate.

4833* Concentration Changes in an Aerosol. J. F. Richardson and E. R. Wooding. *Chemical Engineering Science*, v. 7, nos. 1-2, 1957, p. 51-59.

In a small sample of monodisperse aerosol, the concentration of particles was measured as a function of vertical position and time. The results verify the equation defining the concentration distribution.

4834* (German.) The Thermodynamics of Technical Methane Reactions (Taking as an Example the Formation of Acetonitrile From Methane and Cyanogen Chloride). **Thermodynamik technischer Methan-Reaktionen (am Beispiel der Bildung von Acetonitril aus Methan und Chlorcyan).** W. Fuchs, K. H. Andres, J. Plenz, and O. Veiser. *Chemie-Ingenieur-Technik*, v. 29, no. 12, Dec. 1957, p. 768-771.

Thermodynamic treatment of reaction between CH_4 and some inorganic and organic compounds. Production of acetonitrile. Effect of temperature, flow velocity, and mixing relationships on the yield.

4835* (Russian.) Kinetic Laws of High-Temperature Cracking of Ethane. **O kineticheskikh zakonomernostiakh vysokotemperaturnogo krekinga etana.** A. M. Brodskii, R. A. Kalinenko, K. P. Lavrovskii, and V. B. Titov. *Doklady Akademii Nauk SSSR*, v. 116, no. 5, Oct. 11, 1957, p. 789-792.

A study of the total kinetics of ethane cracking between 800 and 900 C. A special method was used with higher temperatures and corresponding decrease of the reaction time to 0.5-0.005 sec. Direct cracking; chromatographic analysis of the products

4836* (German.) Modern Desulfurization Equipment at a Medium Size Gas Plant. **Eine neuzeitliche Entschwefelungsanlage in einem mittleren Gaswerk.** Wilhelm Weyh. *Gas- und Wasserfach*, v. 98, *Ausgabe Gas*, no. 49, Dec. 6, 1957, p. 1228-1234.

Details of equipment, considering installation and costs.

4837* (French.) Separation of Low Boiling Point Hydrocarbons by Adsorption in the Vapor Phase. **La séparation des hydrocarbures à bas point d'ébullition par adsorption en phase vapeur.** F. H. Garner, S. R. M. Ellis, D. C. Steer, and D. W. Thompson. *Génie Chimique (Supplement to Chimie & Industrie)*, v. 78, no. 5, Nov. 1957, p. 141-151.

Equilibrium characteristics of binary mixtures containing benzene or methyl-cyclohexane as well as ethyl alcohol, methyl-ethyl-ketone, and *n*-hexane. Results were compared with the values for liquid-vapor equilibrium.

4838* Design of a Fischer-Tropsch Synthesis Pilot Plant. E. Weingaertner and P. K. Deshpande. *Indian Institute of Science, Journal*, v. 39, sec. A, Oct. 1957, p. 239-247 + 3 plates.

Plant consists of gas purification and cracking units, and the synthesis reactor. The synthesis gas is prepared by converting kerosene-cracked gas by reacting it with steam at high temperatures over Ni catalyst.

4839* Data on the Vaporisation of Coal Tar and Its Fractions. I. Equilibrium Flash Vaporisation. II. Latent Heat of Vaporisation. D. K. H. Briggs and F. Popper. *Institution of Chemical Engineers, Transactions*, v. 35, no. 6, 1957, p. 369-379.

Describes an equilibrium flash vaporization unit suitable for the determination of atmospheric and subatmospheric equilibrium flash vaporization data of tars and tar fractions and two methods for the determination of latent heats of vaporization of mixtures.

4840* Chemical Processing of Nuclear Fuels. C. M. Nicholls and R. Spence. *Institution of Chemical Engineers, Transactions*, v. 35, no. 6, 1957, p. 380-393.

Development of chemical processes for the military production program is described and a distinction is drawn between the basic requirements of this program and those of the future atomic power program.

4841* The Separation of HD and H_2 by Absorptive Fractionation. D. R. Augood. *Institution of Chemical Engineers, Transactions*, v. 35, no. 6, 1957, p. 394-408.

For a given solvent, the absorptive separation factor β has been defined as the ratio of the corresponding Henry's law constants for the solutes concerned. Hildebrand's theory of solution has been used to express the separation factor for zero (hydrogen) pressure as a function of temperature.

4842* (Russian.) Contacting Fine-Grained Solid Materials With Gases and Vapors in Heterogeneous Chemical Processes by the Step Counterflow Method. **O stupenchato-protivotochnom metode kontaktirovaniia melkozernistykh tverdykh materialov s gazami i parami v geterogennykh khimicheskikh protsessakh.** D. I. Orochko, T. Kh. Melik-Akhnazarov, and G. N. Poluboiarinov. *Khimmiia i Tekhnologiia Topliva i Masel*, 1957, no. 12, Dec., p. 1-12.

Suggests classification of fractionating equipment, based on a technological sequence of solid material treatment, and on the nature of movement of gaseous and solid materials in respect to each other. Possible construction schemes of sectional reactors. Superiority of the step counterflow method over others, and its effect on faster oxidizing regeneration of catalysts was studied and experimentally proved.

4843 Application of Mixer-Settlers to the Purex Process. J. K. Davidson, A. C. Schafer, Jr., and W. O. Haas, Jr. *Knolls Atomic Power Laboratory (U. S. Atomic Energy Commission)*, KAPL-1809, May 1957, 32 p. (UF767 Un3.1ka Contin.)

Experience with pilot-plant pump-mix units in Purex system studies is cited to show that this equipment is reliable, flexible in operation, and capable of high efficiency.

4844 Development of a Batch Process for the Production of a ZrO_2-UO_2 Solid Solution. S. W. Hayter and R. J. Bard. *Los Alamos Scientific Laboratory (U. S. Atomic Energy Commission)*, LA-2138, Nov. 1957, 17 p. (UF767 U3La Contin.)

Tetragonal ZrO_2-UO_2 solid solution in the weight proportion of about 4 to 1, with no UO_2 lines showing on the X-ray powder diffraction patterns, can be prepared from a precipitate of $Zr(OH)_4$-$(NH_4)_2U_2O_7$ which is filtered, dried, milled, screened to −325 mesh, and heated at 900 C in H_2 for 4 hrs.

4845 Oxidation of Uranium Tetrafluoride in a Moving-Bed Reactor. H. W. Franz and R. H. Toye. *Oak Ridge National Laboratory (U. S. Atomic Energy Commission)*, ORNL-2409, Jan. 1958, 29 p. (UF767 U3o Contin.)

A short study was made of the oxidation of UF_4 to UF_6 with three runs in a 4-in. dia moving-bed reactor. Combustion of controlled additions of powdered C or CO was used to obtain reaction temperatures.

4846 Chemical Processing Instrumentation and Control Research Program. Harry Scheider. *Phillips Petroleum Co., Idaho Operations Office (U. S. Atomic Energy Commission)*, IDO-14420, Sept. 1957, 27 p. (UF767 Un3.1id Contin.)

Philosophy and objectives, a survey of the problems involved, general approach, lines of endeavor, and specific applications for a program for development of analytical instrumentation and improved techniques in nuclear fuel reprocessing are presented.

4847* The Manufacture of Hydrocyanic Acid by the Andrussow Process. J. M. Pirie. *Platinum Metals Review*, v. 2, Jan. 1958, p. 7-11.

Surveys various features of this process, particularly the variety of Pt metal catalysts employed.

4848* (Polish.) Modern Methods of Natural Gas Purification and Dehydration. **Nowoczesne metody oczyszczania i osuszania gazu ziemnego.** Werner Mull and Karol Rogge. *Przeglad Techniczny*, v. 12, Dec. 1957, p. 977-981.

Composition of natural gas and description of various processes using the following equipment: dehydrating system with a horizontal task and a photo cell for automatic water discharge; adsorbing system with continuous drying; expansion system with two counter flow heat exchangers. Dehydrating system for damp gas.

4849* (Polish.) Study of Adsorbers and Isotherms of Adsorption by the Application of Powder Electrodes. **Badanie adsorbentów i izoterm adsorpcji za pomoca elektrod proszkowych.** W. Tomassi, H. Jankowska, and M. Prokopowicz. *Przemysl Chemiczny*, v. 13, no. 12, Dec. 1957, p. 683-688.

Successful application of the powder electrode method for characterizing adsorbers (activated carbon and silica gel) and examining the isotherms of adsorption of different substances. Study of the processes occurring on electrodes containing C with an adsorption layer or silica gel.

4850 Surfactants Listed. Fourth Revision of Synthetic Detergents and Emulsifiers. II. John W. McCutcheon. *Soap and Chemical Specialties*, v. 34, Jan. 1958, p. 44-62.

Data on manufacturers, class and formula, uses, percent concentration, and types. (To be continued.)

4851* (Finnish.) Latest Developments in the Field of Explosives Industry. **Räjähdysaineteollisuudessamme tapahtuneesta viimeaikaisesta kehityksestä.** Olli Ollila. *Teknillisen Kemian Aikakauslehti*, v. 14, no. 19, Nov. 30, 1957, p. 485 + 2 pages.

Biazz continuous method for making nitroglycerol-glycol. Work safety and product quality improvement. Automatic process control.

4852* (Norwegian.) Thermal Decomposition of Acetaldehyde in a Continuous Reactor. A Kinetic Analysis. **Termisk spalting av acetaldehyd i en kontinuerlig reaktor. En kinetisk analyse.** Hallvard Nilsen. *Tidsskrift for Kjemi, Bergvesen og Metallurgi*, v. 17, no. 9, 1957, p. 149-153.

The thermal decomposition of acetaldehyde into CH_4 and CO was investigated in plant size equipment in the temperature range 430-530 C.

4853* (Russian.) Common Regularities of the Absorption Processes in High-Speed Rotary Absorbers. **Obshchie zakonomernosti protsessov absorbtsii v rotatsionnykh absorberakh s bol'shim chislom oborotov.** S. N. Ganz. *Zhurnal Prikladnoi Khimii*, v. 30, no. 11, Nov. 1957, p. 1604-1614.

The most suitable hydrodynamic conditions producing the maximum ion absorption processes are: more developed phase contact, impact effect of the drops, intensive friction between gas and liquid, and rapid hydrodynamic transport of the reacting components.

See also: **5010** (hydration of C_2H_4); **6066** (plastic pipe in chemical industry); **6091** (purification of sea water).

CHEMISTRY—ANALYTICAL

4854* Hydroxyproline Analysis as a Tool for Tannery Chemists. Robert M. Lollar. *American Leather Chemists Association, Journal*, v. 53, Jan. 1958, p. 2-23.

Data are presented on the precision of the determination of hydroxyproline by a modified form of the Neuman-Logan colorimetric procedure.

4855 Direct Determination of Saturated Fatty Acids in Fats, Oils, and Methyl Esters. D. F. Kuemmel. *American Oil Chemists' Society, Journal*, v. 35, Jan. 1958, p. 41-45.

Procedure involves methanolysis of the triglycerides to produce methyl esters, followed by oxidation of the unsaturated methyl esters by $KMnO_4$.

4856 The Use of Selective Desorption From Carbon Columns for the Determination of Dextrose and Maltose in Starch Conversion Products. Stella J. Patterson and R. I. Savage. *Analyst*, v. 82, Dec. 1957, p. 812-818.

4857 Selectivity of Various Liquid Substrates Used in Gas Chromatography. H. M. Tenney. *Analytical Chemistry*, v. 30, Jan. 1958, p. 2-8.

Eighteen liquid substrates were screened as to selectivity toward types of hydrocarbons and oxygenated compounds. The results permit comparison of retention between compound types at various boiling point levels.

4858 Gas Chromatography of Olefins. Determination of Pentenes and Hexenes in Gasoline. H. S. Knight. *Analytical Chemistry*, v. 30, Jan. 1958, p. 9-15.

4859 Gas Chromatography. Effect of Type and Amount of Solvent on Analysis of Saturated Hydrocarbons. F. T. Eggertsen and H. S. Knight. *Analytical Chemistry*, v. 30, Jan. 1958, p. 15-20.

4860 Determination of Five- to Seven-Carbon Saturates by Gas Chromatography. F. T. Eggertsen and Sigurd Groennings. *Analytical Chemistry*, v. 30, Jan. 1958, p. 20-25.

The saturates portion of a reformer charge stock, containing chiefly C_6 and C_7 compounds, can be analyzed for all but one of its 25 C_5 to C_7 components by gas chromatography employing three separate columns.

4861 Rapid Chromatographic Analysis of Soap-Thickened Lubricating Greases. George W. Powers, Jr. and Frank J. Piehl. *Analytical Chemistry*, v. 30, Jan. 1958, p. 28-31.

A simple chromatographic method for soap and oil determination in greases made from petroleum, silicone, and ester oils.

4862 Chromatographic Identification and Determination of Organic Acids in Water. H. F. Mueller, T. E. Larson, and W. J. Lennarz. *Analytical Chemistry*, v. 30, Jan. 1958, p. 41-44.

Technique provides a new method for the separation of anionic synthetic detergents from analytical interferences. It may be considered as a research tool, where B.O.D. and C.O.D. determinations are inadequate, which may be further developed for study of additional metabolic products of biological purification processes.

4863 Spectrophotometric Determination of Iron With Ethylenediamine Di(*o*-Hydroxyphenylacetic Acid). A. L. Underwood. *Analytical Chemistry*, v. 30, Jan. 1958, p. 44-47.

The ferric complex of the reagent is so stable that color development is maximal over a wide pH range, and a large excess of reagent is not necessary.

4864 Carrier Precipitation of Trace Elements. Radioisotope Evaluation of Efficiency. Edward E. Pickett and Bobby E. Hankins. *Analytical Chemistry*, v. 30, Jan. 1958, p. 47-50.

The efficiency of separation of the trace elements Cu, Co, and Mo from the major constituents of agricultural samples by precipitation with aluminum oxinate or indium oxinate carrier, with or without thionalide or tannic acid, was determined by means of radioisotopes.

4865 Rapid Spectrophotometric Determination of Submilligram Quantities of Uranium. Carl A. Francois. *Analytical Chemistry*, v. 30, Jan. 1958, p. 50-54.

Uranyl ion can be separated from contaminants by solvent extraction from an $Al(NO_3)_3$ solution using tributyl phosphate in isooctane. Color is developed by introducing an aliquot of the extract into an acetone-water solution of dibenzoyl-methane and pyridine.

4866 Photometric Determination of Iproniazid and Related Compounds. Remo J. Colarusso, Morton Schmall, Ernest G. Wollish, and E. G. E. Shafer. *Analytical Chemistry*, v. 30, Jan. 1958, p. 62-65.

The reaction of molybdic acid with iproniazid in a medium of acetone results in a reddish complex formation, which is stable in solution. The color absorbance follows Beer's law and can be determined photometrically at either 430 or 535 mμ with good precision.

4867 Resolution of Acid Mixtures in Nonaqueous Solvents. Potentiometric Titration of Dibasic Acids With Quaternary. Ammonium Titrants. Gerald A. Harlow and Garrard E. A. Wyld. *Analytical Chemistry*, v. 30, Jan. 1958, p. 69-72.

Curves are presented for the titration of sulfuric, oxalic, and succinic acids in mixtures of water and isopropyl alcohol, ethyl alcohol, methanol, ethyl ether, and pyridine.

4868 Combustion-Amperometric Titration of Traces of Halogen in Petroleum Products. Lawrence J. Cali, J. West Loveland, and Dorothy G. Partikian. *Analytical Chemistry*, v. 30, Jan. 1958, p. 74-77.

4869 Quantitative Determination of Organic Disulfides. Rethel L. Hubbard, William E. Haines, and John S. Ball. *Analytical Chemistry*, v. 30, Jan. 1958, p. 91-93.

Availability of disulfides of known purity allowed comparison of three typical chemical methods; none was suitable for all types of disulfides. The acid-reflux method gave the best overall recoveries but poor recovery of disulfides of lower molecular weight.

4870 Simplified Control Analyses of Solutions Used in Partial Acetylation of Cotton. Edmund M. Buras, Jr., Albert S. Cooper, and Manuel D. Cruz. *Analytical Chemistry*, v. 30, Jan. 1958, p. 104-107.

Volumetric methods have been developed for the rapid analysis of acetic acid-acetic anhydride-perchloric acid and acetic acid-water-perchloric acid mixtures which occur in three-component baths during the practical partial acetylation of cotton.

4871 Detection of Urea, Melamine, Isocyanate, and Urethan Resins. Rapid Group Test for Nitrogen, Silicon, Phosphorus, and Titanium in Coating Materials. M. H. Swann and G. G. Esposito. *Analytical Chemistry*, v. 30, Jan. 1958, p. 107-109.

4872 Detection of Pyrene, Benzo [a] Pyrene, and Other Polynuclear Hydrocarbons. Eugene Sawicki and Robert R. Miller. *Analytical Chemistry*, v. 30, Jan. 1958, p. 109-110.

A new color test was developed for the detection of polynuclear compounds. A brillant dark blue color was obtained with pyrene and benzo [a] pyrene.

4873 Analysis of High-Purity Iron. R. E. Heffelfinger, D. L. Chase, G. W. P. Rengstorff, and W. M. Henry. *Analytical Chemistry*, v. 30, Jan. 1958, p. 112-114.

Separation of metallic impurities by ether extraction of Fe and spectrographic analysis of the remaining aqueous solution are used for Mn, Cu, Ni, Cr, V, Co, Al, Pb, Ti, W, and Zr. Sulfide precipitation and subsequent spectrographic analysis are used for elements in the sulfide group. Methods for Si, Mg, Ca, B, C, O, H, and N are also described.

4874 Improved Method for Performing Density-Gradient Electrophoresis. Robert L. Berg and Richard G. Beeler. *Analytical Chemistry*, v. 30, Jan. 1958, p. 126-129.

Density-gradient electrophoresis is performed in a compact apparatus which reduces the volume of solutions needed, and by use of Ag-AgCl electrodes avoids release of gas during electrophoresis.

4875 Microdetermination of Carbon and Hydrogen by a Rapid Combustion Procedure. George I. Robertson, Louise M. Jett, and Louis Dorfman. *Analytical Chemistry*, v. 30, Jan. 1958, p. 132-135.

4876 Ultramicromethod for Molecular Weight Determination. G. O. Guerrant. *Analytical Chemistry*, v. 30, Jan. 1958, p. 143-149.

Test material is suspended from a calibrated helical W spring enclosed within a vessel containing a standard reference solution. Solvent is distilled isothermally from the reference solution into the test material until the vapor pressures are equal. The molecular weight of the test material is calculated from the sample size, the amount of solvent distilled, and the molality of the standard reference solution.

4877 Emission Spectrometric Determination of Oxygen in Titanium and Titanium Alloys. Velmer A. Fassel and William A. Gordon. *Analytical Chemistry*, v. 30, Feb. 1958, p. 179-182.

Method is based on the d.c. carbon arc excitation of a special electrode assembly which provides a molten Pt bath after the arc is initiated. The O in the sample is rapidly liberated from this bath into an Ar atmosphere which supports the arc discharge.

4878 Determination of 1,1'-Ferrocene Dicarboxylic Acid in Presence of Ferrocene Monocarboxylic Acid by Infrared Spectroscopy. Eugene F. Wolfarth. *Analytical Chemistry*, v. 30, Feb. 1958, p. 185-186.

4879 Identification of Reclaimed Oils by Statistical Discrimination of Infrared Absorption Data. Andrew Ungar and Anthony M. Trozzolo. *Analytical Chemistry*, v. 30, Feb. 1958, p. 187-191.

A function, Q, of the infra-red absorbances of a lubricating oil at 14 wave lengths, is an excellent discriminator between virgin and reclaimed oils.

4880 Determination of Arsenic in Hydrocarbon Reforming Catalysts by Neutron Activation. G. F. Shipman and O. I. Milner. *Analytical Chemistry*, v. 30, Feb. 1958, p. 210-212.

Sample is irradiated in a reactor having a flux of the order of 10^{12} neutrons per sq. cm. per sec. The catalyst is fused with alkali and the As is separated by distillation as the pentabromide.

4881 Ascending Chromatography of Polyphosphates. George G. Berg. *Analytical Chemistry*, v. 30, Feb. 1958, p. 213-216.

Variables studied included selection and concentration of components of solvent, composition of atmosphere, and condition of paper.

4882 Gas Chromatography. Determination of Constituents in the Study of Azeotropes. J. F. Haskin, G. W. Warren, L. J. Priestley, Jr., and V. A. Yarborough. *Analytical Chemistry*, v. 30, Feb. 1958, p. 217-219.

Studies were made of ternary mixtures of acetone, methanol, and methyl acetate; chloroform, 2-propanol, and methyl ethyl ketone; and acetonitrile, ethanol, and triethylamine.

4883 Gas-Liquid Partition Chromatography of Fluorocarbons. T. M. Reed, III. *Analytical Chemistry*, v. 30, Feb. 1958, p. 221-228.

4884 Apparatus for Continuous Electrochromatography. Harold H. Strain. *Analytical Chemistry*, v. 30, Feb. 1958, p. 228-231.

The stabilization medium for the flow of the background electrolytic solution and concomitant transverse electrical migration is a tapered sheet of soft, thick filter paper supported on a block of solidified polystyrene foam.

4885 Complexometric Titration of Copper and Other Metals in Mixture. 1-(2-Pyridylazo)-2-naphthol (Dye) as Indicator. K. L. Cheng. *Analytical Chemistry*, v. 30, Feb. 1958, p. 243-245.

4886 Determination of Alkylpyridines by Infrared Spectroscopy. Rapid Methods of Analysis. Robert L. Bohon, Raymond Isaac, Henry Hoftiezer, and Robert J. Zellner. *Analytical Cheimstry*, v. 30, Feb. 1958, p. 245-251.

4887 Determination of Pyrrolic Nitrogen in Petroleum Distillates. M. A. Muhs and F. T. Weiss. *Analytical Chemistry*, v. 30, Feb. 1958, p. 259-266.

An improved colorimetric determination of pyrrolic compounds uses the reaction with *p*-dimethylaminobenzaldehyde. The adverse effect of olefins was eliminated by preliminary chromatographic separation.

4888 Determination of Very Small Amounts of Carbon in Metals. Robert E. Fryxell. *Analytical Chemistry*, v. 30, Feb. 1958, p. 273-275.

The blank contributed by ceramic crucibles exposed to the air is considerably reduced by controlling the combustion temperature with a variable transformer.

4889 Fractionation of Certain Aromatic Hydrocarbons With Molecular Sieve Adsorbents. Beveridge J. Mair and Muthu Shamaiengar. *Analytical Chemistry*, v. 30, Feb. 1958, p. 276-279.

The mixture is introduced into a column containing the Molecular Sieve adsorbent, the portion which is not adsorbed is eluted with iso-octane, and the adsorbed portion is desorbed and brought out of the column with superheated steam or with ethyl alcohol at 75 C.

4890 Semimicro Hydrogenation With Electrically Generated Hydrogen. John W. Miller and Donald D. DeFord. *Analytical Chemistry*, v. 30, Feb. 1958, p. 295-298.

The conventional gas buret and leveling bulb were replaced by a U-shaped electrolysis cell, which served as a source of H and a pressure-regulating device.

4891* (French.) A Cause of Error in the Wet Method of Estimation of Nitrogen in Special Steels. **Sur une cause d'erreur dans le dosage par voie humide de l'azote dans les aciers speciaux.** René Castro, Jacques Allemand, and René Poussardin. *Analytica Chimica Acta*, v. 17, no. 6, Dec. 1957, p. 530-534.

Impurities in the acid or traces of Mo in the metal will cause error in the Kjeldahl analysis.

4892* (English.) **Oxine Complex of Molybdenum.** D. V. Ramana Rao. *Analytica Chimica Acta*, v. 17, no. 6, Dec. 1957, p. 538-540.

Under defined conditions Mo is not precipitated by 8-hydroxyquinoline at pH values higher than 2.24. Maintaining the solution at high pH value is itself sufficient and no other external complexing agent is necessary for masking Mo.

4893* (English.) **Paper Chromatography of Metal Complexes. III. Relationship Between the R_F and the Stability of Metal Complexes.** Aviezer Stevan Kertes. *Analytica Chimica* Acta, v. 17, no. 6, Dec. 1957, p. 570-574.

The R_F values can be related to the stability constants of the corresponding metal-ligand coordination compounds and are applied to prove graphically the stoichiometric identity of the two or more complexes formed by paper chromatography in a given system.

4894* (German.) Microanalytical Tests in Iron Research. **Mikroanalytische Untersuchungen in der Eisenforschung. III.** Handling of Microgram Quantities in Metallographic Tests. **Handhabung von Mikrogrammengen bei metallkundlichen Untersuchungen.** Walter Koch, Hanns Malissa, and Dagmar Ditges. *Archiv für das Eisenhüttenwesen*, v. 28, no. 12, Dec. 1957, p. 785-794.

Gliding manipulator and stereomicroscope. Extraction of a microgram sample by boring and by electrolysis. Production of microsection surfaces. Sorting and selecting samples. Structural X-ray analysis. Quantitative analyses within the nanogram range.

4895 An X-Ray Spectrometric Method for Determination of Plutonium in Solution. D. S. Flikkema and R. V. Schablaske. *Argonne National Laboratory (U. S. Atomic Energy Commission)*, ANL-5804, Nov. 1957, 11 p. (UF767 Un3.1an Contin.)

X-ray emission spectrometry can be extended advantageously to the determination of Pu in solution since X-ray emission from the heavier elements is little influenced by valence state.

4896 The Determination of Fission Product Ruthenium. R. P. Larsen, L. E. Ross, and Gwendolyn Kesser. *Argonne National Laboratory (U. S. Atomic Energy Commission)*, ANL-5810, Dec. 1957, 7 p. (UF767 Un3.1an Contin.)

Improvements in Glendenin's procedure were made. The distillation is from a dilute sulfuric acid-sodium bismuthate mixture. Conditions for quantitative volatilization and collection of the tetroxide, as well as reduction to the dioxide, were established.

4897 Development of Paper Chromatographic Techniques. A. D. Clarke and G. Bazill. *British Plastics*, v. 31, Jan. 1958, p. 16-19.

Procedure makes possible the identification of sebacates, azelates, adipates, phthalates, and benzoates in vinyl compounds in the presence of most commercially available plasticizers.

4898* The Analysis of Three-Component Liquid Systems. J. R. Bourne. *Chemical & Process Engineering*, v. 39, Jan. 1958, p. 19-23.

General requirements; chemical and physical methods of analysis; density measurement.

4899 Potentiometric Electrode Systems in Nonaqueous Titrimetry. John T. Stock and William C. Purdy. *Chemical Reviews*, v. 57, Dec. 1957, p. 1159-1177.

Reviews deals with chloranil, quinhydrone, H, glass, Sb, Pt, Ag, and other precious metal electrodes and miscellaneous indicator and reference electrodes.

4900 A Universal Composition/Anticomposition Calculator for Use in Organic Chemical Analyses. W. D. Crow and Yolande M. Greet. *Chemistry & Industry*, 1957, no. 50, Dec. 14, p. 1618-1621.

4901* (French.) Spectrophotometry in Industrial Chemistry. **La spectrophotométrie en chimie industrielle.** H. W. Thompson. *Chimie Analytique*, v. 39, no. 12, Dec. 1957, p. 445-448.

Importance of infra-red measurements for the determination of molecular structure, qualitative and quantitative analysis of mixtures, and industrial continuous analytical control. Application of spectrophotometry based on molecular vibrations.

4902* (French.) New Methods of Silicate Analysis. **Nouvelles méthodes d'analyse des silicates.** I. A. Voinovitch. *Chimie Analytique*, v. 39, no. 12, Dec. 1957, p. 454-460.

Recent evolution in silicate analysis and different modern techniques. A rapid method based on colorimetry. Partial analysis of aluminosilicates.

4903 (French.) Remark on the Determination of Carbon by Combustion in Unalloyed Steels. **Remarque sur le dosage du carbone par combustion des aciers non alliés.** R. Boulin and E. Jaudon. *Chimie Analytique*, v. 39, no. 12, Dec. 1957, p. 463-466.

Points out the importance of temperature and O delivery for correct combustion of the metal.

4904* (French.) A New Method for the Analysis of Cuprous Alloys. **Nouvelle méthode d'analyse des alliages cuivreux.** M. Kuhn. *Chimie Analytique*, v. 40, no. 1, Jan. 1958, p. 11-19.

Method involves complete solution of the alloy by means of a nitric-fluoric-boric acid attack and by the determination, in aliquot parts, of most elements present. Application to tin bronzes and general application.

4905* (Italian.) Identification and Chromatographic Separation of the Products Obtained From Phenylalanine by Irradiation With Slow Neutrons. **Identificazione e separazione cromatografica dei prodotti ottenuti dalla fenilalanina per irradiazione con neutroni lenti.** Renato Barbieri, Umberto Belluco, and Maria Bruno. *Gazzetta Chimica Italiana*, v. 87, no. 12, Dec. 1957, p. 1377-1392.

Determining the existence and proportion of many products containing radioactive C formed by "nascent" C-14 following the $N^{14}(n,p)\ C^{14}$ nuclear reaction. Decomposition of phenylalanine and formation of radioactive polymers.

4906 Spectrophotofluorometry for Pesticide Determinations. Irwin Hornstein. *Journal of Agricultural and Food Chemistry*, v. 6, Jan. 1958, p. 32-34.

4907 Electrical Methods of Analysis. A. J. Martin. *Journal of Chemical Education*, v. 35, Jan. 1958, p. 10-13.

Potentiometry, polarography, and electrodeposition; applications to analytical methods used in chemistry.

4908* (Hungarian.) Rapid Determination of Basicity of Slag by Measuring the Neutralization Heat. **Salakbazicitás gyors meghatározása közömbösítési nő mérése alapján.** István Sajó *Kohászati Lapok*, v. 12, no. 7, July 1957, p. 287-289.

Basicity and FeO content determination from one measurement. Details of method. Accuracy of results.

4909* Instrumental Analysis of Petroleum. *Lubrication*, v. 44, Jan. 1958, 12 p.

Fundamentals of infrared absorption. Emission, X-ray, and mass spectroscopy are treated.

4910 (Hungarian.) Determination of Metal Traces in Natural Waters by Means of Spectral Analysis. **Fémnyomok meghatározása ozinképelemzéssel természetes vizekben.** Zoltán Nagy and Edit N. Pólyik. *Magyar Kémiai Folyóirat*, v. 63, no. 11, Nov. 1957, p. 297-302.

Methods of qualitative and semi-quantitative determination of metal traces in dry residue. Spectral analysis was applied with the help of a logarithmic sector approach.

4911 (Hungarian.) Direct Determination of Selenite by Potassium Ferricyanide. **Szelenit gyors meghatározása káliumferricianid merõoldattal.** Solymosi Frigyes. *Magyar Kémiai Folyóirat*, v. 63, no. 11, Nov. 1957, p. 313-316.

Selenite-ferricyanide reactions proceed very slowly even at a high temperature and high base concentration, but on adding osmium tetroxide catalyst they may become instantaneous under suitable experimental conditions. Effect of different ions on precision of the determination.

4912 The Analysis of Silver Solder Alloys. E. Jackson. *Metallurgia*, v. 56, no. 338, Dec. 1957, p. 307-309.

Method involves a cation exchange chromatographic separation of Cd followed by an anion exchange separation of Zn.

4913 Determination of Boron in Aluminum-Uranium Fuel Elements. Kenneth W. Puphal, James A. Merrill, Glenn L. Booman, and James E. Rein. *Phillips Petroleum Co., Idaho Operations Office (U. S. Atomic Energy Commission)*, IDO-14418, Oct. 1957, 13 p. (UF767 Un3.1id Contin.)

A rapid spectrophotometric method for the determination of B in Al-U alloys, particularly in non-irradiated ETR fuel element samples.

4914 Method of Radioassay of Volatile Compounds. Rolfe H. Herber. *Review of Scientific Instruments*, v. 28, Dec. 1957, p. 1049-1051.

Method for the radioassay of volatile materials labeled with β emitters of more than 0.15 m.e.v. energy. The sensitive detection element is a thin-walled Al G. M. tube sealed into an annular jacket and attached directly to a high-vacuum manifold.

4915* (English.) **Photoelectric Spectrochemical Analysis for the Trace of Boron in Graphite.** Yoshio Urano. *Science of Light (Japanese)*, v. 6, no. 2, Aug. 1957, p. 49-57.

Boron is determined by means of a "Quantorecorder". The light source is an a.c. arc triggered by a Tesla coil. Using an arc line of C as the internal standard line, another arc line of C and the resonance line of B are measured under the discharge condition that the intensity ratio of the above two lines of C would take an appropriately chosen value.

4916* (English.) **Infra-Red Spectrum of Tetramethylhydrazine.** D. C. McKean. *Spectrochimica Acta*, v. 10, no. 2, Dec. 1957, p. 161-169.

Infra-red spectrum of gaseous tetramethylhydrazine was measured from 4500 to 400 cm^{-1}, using a conventional prism spectrometer.

4917* (Russian.) The Amperometric Titration of Indium by Complexon. **Amperometricheskoe titrovanie indiia kompleksonom.** V. M. Vladimirova. *Zavodskaia Laboratoriia*, v. 23, no. 11, Nov. 1957, p. 1286-1289.

Titration at pH 1 to 3, and in the presence of Zn, Mn, Co, Cd, Al, and Pb which do not interfere.

4918* (Russian.) Determining the Carbide Content in Stainless Steel by Electrolysis Method. **Opredelenie karbidov v nerzhaveiushchei stali metodom elektroliza.** M. M. Shapiro. *Zavodskaia Laboratoriia*, v. 23, no. 11, Nov. 1957, p. 1292-1294.

For each sample, 50 mm. long and 10 mm. in diameter, 4 liters of electrolyte is needed containing 15% NaCl and 2.5% of tartaric or citric acid. A glass container is suggested for electrolysis. A current density is set from 0.6 to 0.7 a/cm^2. Duration of electrolysis is limited from 30 to 45 min., enough to dissolve from 4 to 7 g. of metal. Stainless samples are pickled for 2-3 min. before being subjected to electrolysis.

4919* (Russian.) Spectral-Analytical Determination of Admixtures in Titanium. **Spektral'no-analiticheskoe opredelenie primesei v titane.** L. N. Filimonov, A. I. Essen, and Z. A. Zakharova. *Zavodskaia Laboratoriia*, v. 23, no. 11, Nov. 1957, p. 1313-1315.

A method is given by which the following metallic components were determined in concentrations from 0.01 to 0.2%: Mg, Mn, Fe, Si, W, Al, Ni, Co, V, Mo, Cr, and Nb.

4920* (Russian.) Spectral Analysis of Beryllium. **Spektral'nyi analiz berilliia.** P. M. Poliakov, A. K. Rusanov, and I. M. Blokh. *Zavodskaia Laboratoriia*, v. 23, no. 11, Nov. 1957, p. 1320-1323.

4921* (Russian.) Spectrochemical Determination of Small Amounts of Uranium in Crude Samples. **Spektrokhimicheskoe opredelenie malykh kolichestv urana v prirodnykh obraztsakh.** T. M. Moroshkina, V. K. Prokof'ev, and M. N. Smirnova. *Zavodskaia Laboratoriia*, v. 23, no. 11, Nov. 1957, p. 1324-1327.

A method for determining U in the range from 10^{-3} to 10^{-4} as found in ores and minerals.

4922* (Russian.) Determination of Zirconium by Amperometric Titration With the Use of Cupferron. **Opredelenie tsirkoniia amperometricheskim titrovaniem s primeneniem kupferona.** Iu. I. Usatenko and G. E. Bekleshova. *Zavodskaia Laboratoriia*, v. 23, no. 12, Dec. 1957, p. 1406-1407.

The investigated zirconium silicate had the following composition: 67.1% ZrO_2; 29.9% SiO_2; 2.76% Al_2O_3. At optimum titration conditions, the solutions containing from 0.162 to 5.67 mg. of ZrO_2 were analyzed. The result confirmed data obtained with cupferron.

4923* (German.) Qualitative Inorganic Analysis by Means of Paper Chromatography. Separation of the Usual Cations. **Qualitative anorganische Analyse mittels Papierchromatographie, Trennungsgang der gebräuchlichen Kationen.** E. Pfeil, A. Friedrich, and Th. Wachsmann. *Zeitschrift für Analytische Chemie*, v. 158, no. 6, 1957, p. 429-434.

An improved method, and its application for separation of the usual cations of the compounds belonging to the Pt, $(NH_4)_2CO_3$, $(NH_4)_2S$, and alkali groups.

4924* (German.) Analytical Determination of Arsenic as Quinolinearsenomolybdate. **Massanalytische Bestimmung von Arsen als Chinolinarsenmolybdat.** S. Meyer and O. G. Koch. *Zeitschrift für Analytische Chemie*, v. 158, no. 6, 1957, p. 434-438.

4925* (German.) Complexometric Simultaneous Determination of Copper and Manganese. **Über die komplexometrische Bestimmung von Kupfer und Mangan nebeneinander.** G. Martens and K. Schwarz. *Zeitschrift für Analytische Chemie*, v. 159, no. 1, 1957, p. 22-25.

4926* (German.) Analysis of Nickel Alloys for Oxide Cathodes. **Analyse von Nickellegierungen für Oxydkathoden. IV.** Determination of Copper. **Die Bestimmung des Kupfers.** K. Riedel. *Zeitschrift für Analytische Chemie*, v. 159, no. 1, 1957, p. 25-29.

A colorimetric method is used.

4927* (German.) Triethylenetetramine (Triene) as an Analytical Reagent. **Triäthylentetramin (Trien) als analytisches Reagens. II.** Photometric Titration of Copper in the Presence of Other Metals. **Photometrische Titrationen von Kupfer neben anderen Metallen.** H. Flaschka and A. Soliman. *Zeitschrift für Analytische Chemie*, v. 159, no. 1, 1957, p. 30-35.

Methods of preventing interference by various other metals.

4928* (German.) Precipitation of Uranium by Means of Dimethyl Arsinic Acid. **Die Fällung von Uran mit Kakodylsäure.** R. Pietsch. *Zeitschrift für Analytische Chemie*, v. 159, no. 1, 1957, p. 37-41.

4929* (Russian.) Study of $BeSO_4$-NaOH-H_2O System and Its Analytical Application. **Issledovanie sistemy $BeSO_4$-NaOH-H_2O i ee analiticheskoe primenenie.** I. V. Tananaev and E. P. Shcheglova. *Zhurnal Analiticheskoi Khimii*, v. 12, no. 6, Nov.-Dec. 1957, p. 671-676.

This study was devoted to the following problems: to establish a relation between the amount of precipitated Be and the ratio of the initial NaOH:$BeSO_4$ mixture; to determine solid phase composition at ratios close to stoichiometric; to determine solubility of $Be(OH)_2$ with excess alkali in the system; to try new variants in analytical separation of Be and Al by means of alkali.

4930* (Russian.) Isotope-Dilution Analytical Technique. **Tekhnika opredelenii metodom izotopnogo razbavleniia.** G. N. Bilimovich and I. P. Alimarin. *Zhurnal Analiticheskoi Khimii*, v. 12, no. 6, Nov.-Dec. 1957, p. 685-689.

Using Bi and Pb as an example, the isotope-dilution method is described. The influence of a number of factors on the accuracy of the method was studied. RaE(Bi^{210}) and ThB(Pb^{212}) isolated in a radiochemically pure state were used as radioactive isotopes.

4931* (Russian.) Rapid Luminescent Determination of Uranium in Solutions. **Ob ekspressnom liuminestsentnom opredelenii urana v rastvorakh.** A. F. Fioletova. *Zhurnal Analiticheskoi Khimii*, v. 12, no. 6, Nov.-Dec. 1957, p. 718-719.

Improvements of the rapid luminescent method for the determination of U in the presence of other elements are suggested.

4932* (Russian.) Determination of Small Amounts of Lead in Pure Metals and Ferro-Alloys. **Opredelenie malykh kolichestv svintsa v chistykh metallakh i ferrosplavakh.** L. S. Nadezhina and V. P. Razumova. *Zhurnal Analiticheskoi Khimii*, v. 12, no. 6, Nov.-Dec. 1957, p. 731-735.

A rapid method based on co-precipitating $PbSO_4$ with $SrSO_4$, and dissolving the sulfate precipitate in a hot alkaline solution of complexon III.

See also: **4728** (determination of nicotine in tobacco plants); **4861** (analysis of lubricating grease); **5422** (analysis of CO_2 in solid fuels); **5985** (spectral analysis in light diffusing media); **5999** (new lines in Zr spectra); **6094** (determination of polyisobutlene).

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4933* **Studies on Radioactive Sulphur S^{35} Precipitated in Benzidine Sulphate. I. A Method of Preparing Solid Samples and Measurement of the Self-Absorption Curve.** Erik Ågren. **II. An Interpretation of the Self-Absorption Curve.** Erik Ågren and Erik Odeblad. *Acta Radiologica*, v. 48, Nov. 1957, p. 385-400.

4934 Polarography in Acetonitrile. III. Bronsted Acids. Amperometric Titration of Amines With Perchloric Acid. Oxygen. J. F. Coetzee and I. M. Kolthoff. *American Chemical Society, Journal*, v. 79, Dec. 5, 1957, p. 6110-6115.

The polarography of selected uncharged, cationic, and anionic acids in acetonitrile as solvent, shows that there is a much wider spread in the reduction potentials of acids of different intrinsic strength in acetonitrile than in water.

4935 The Preparation of PuP_2O_7 and $PuPO_4$. Carl W. Bjorklund. *American Chemical Society, Journal*, v. 79, Dec. 20, 1957, p. 6347-6350.

Thermal decomposition of plutonium(IV) oxalatophosphate yielded either pure $PuPO_4$ and PuP_2O_7 or mixtures of these compounds, depending upon the P/Pu ratio in the parent material.

4936 The Preparation and Properties of Hexammineco-balt(III) Borohydride, Hexamminechromium(III) Borohydride and Ammonium Borohydride. R. W. Parry, D. R. Schultz, and P. R. Girardot. *American Chemical Society, Journal*, v. 80, Jan. 5, 1958, p. 1-3.

4937 Chemical Evidence of the Structure of the "Diammoniate of Diborane". I. Evidence for the Borohydride Ion and for the Dihydro-Diammineboron(III) Cation. D. R. Schultz and R. W. Parry. **II. The Preparation of Ammonia-Borane. III. The Reactions of Borohydride Salts With Lithium Halides and Aluminum Chloride. IV. The Reaction of Sodium With Lewis Acids in Liquid Ammonia.** S. G. Shore and R. W. Parry. **V. A Tracer Study of the Reaction Between Sodium and the "Diammoniate of Diborane".** S. G. Shore, P. R. Girardot, and R. W. Parry. *American Chemical Society, Journal*, v. 80, Jan. 5, 1958, p. 4-24.

4938 Molecular Weight Measurements in Liquid Ammonia. The Molecular Weights of the Methylamine-Boranes, the "Diammoniate of Diborane", Ammonia-Boron Trifluoride and Other Substances. R. W. Parry, G. Kodama, and D. R. Schultz. *American Chemical Society, Journal*, v. 80, Jan. 5, 1958, p. 24-27.

4939 Comparison of Active and Inactive Uranium Dioxide-Oxygen Systems. Dale A. Vaughan, J. Robert Bridge, and Charles M. Schwartz. *Battelle Memorial Institute (U. S. Atomic Energy Commission)*, BMI-1241, Dec. 1957, 16 p. (UF767 U3b Contin.)

Inactive UO_2 oxidizes at 180 C to form a tetragonal oxide (U_3O_7), which is ustable on heating above 300 C. The active UO_2 oxidation product retains the cubic symmetry of UO_2 up to the composition $UO_{2.40}$.

4940 The Systems Li_2SO_4-K_2SO_4-H_2O and Li_2SO_4-Na_2SO_4-H_2O at 25°C. A. N. Campbell and E. M. Kartzmark. *Canadian Journal of Chemistry*, v. 36, Jan. 1958, p. 171-175.

The 25 C isotherm of the system Li_2SO_4-K_2SO_4-H_2O shows the existence of the double salt $Li_2SO_4 \cdot K_2SO_4$, whereas that of the system Li_2SO_4-Na_2SO_4-H_2O yields no double salt, but extensive solid solution of Li_2SO_4 in Na_2SO_4.

4941 Reactions of Esters of Phosphorothioic Acid. I. A Comparison of the Hydrolyses of Triethyl Phosphorotrithioiate and Triethyl Phosphate. E. M. Thain. *Chemical Society, Journal,* 1957, Dec., p. 4694-4699.

4942 The Preparation and Properties of Some Plutonium Compounds. VI. Plutonium Dioxide. J. L. Drummond and G. A. Welch. **VII. Plutonium Carbides.** J. L. Drummond, B. J. McDonald, Heather M. Ockenden, and G. A. Welch. *Chemical Society, Journal,* 1957, Dec., p. 4781-4789.

A formula in the range $PuO_{2.00}$-$_{2.09}$ is suggested for plutonium dioxide. The reaction of graphite with Pu metal or hydride at about 900 C was used to prepare PuC. This and Pu_2C_3 were formed by the reduction of PuO_2 with graphite at 1800-1900 C.

4943* (French.) Sodium Polyphosphates. **Sur les polyphosphates de sodium.** André Boullé and Claudine Morin. *Comptes Rendus,* v. 245, no. 22, Nov. 25, 1957, p. 1928-1931.

Preparation of triphosphate $N_2Na_3P_3O_{10}\cdot 1.4\ H_2O$. Formation of a new variety of diphosphate (pyrophosphate $H_2Na_2P_2O_7$) during the thermal evolution of the triphosphate above, and of the products of neutralization of polyphosphorus acids resuling from heating H_3PO_4 in vacuum.

4944* (French.) Silicon Nitride. **Sur le nitrure de silicium.** Jules Lamure and Michel Billy. *Comptes Rendus,* v. 245, no. 22, Nov. 25, 1957, p. 1931-1933.

Only Si_3N_4 is isolated by reaction of N on Si at high temperature. It crystallizes in the orthorhombic system. No Si_2N_3 or SiN are formed.

4945* (Russian.) The Reduction of Higher Iron Oxides by Graphite and Charcoal Added With Na_2CO_3 and K_2CO_3. **Vosstanovlenie vysshikh okislov zheleza grafitom i drevesnym uglem s dobavkami Na_2CO_3 i K_2CO_3.** S. S. Lisniak, E. P. Tatievskaia, and G. I. Chufarov. *Doklady Akademii Nauk SSSR,* v. 116, no. 4, Oct. 1, 1957, p. 656-659.

4946* (Russian.) On the Existence of the CO_3 Oxide. **O sushchestvovanii vysshego okisla CO_3.** R. B. Tagirov and I. P. Shevchuk. *Doklady Akademii Nauk SSSR,* v. 116, no. 5, Oct. 11, 1957, p. 797-799.

An infra-red spectrometer was used. A high CO_3 oxide existed with band carrier ν=1615 cm^{-1}. Effect of O_2 content in O_2+N_2 on intensity of ν=1615cm^{-1}. Intensity of the OH lines.

4947* (Russian.) Reduction of Al_2O_3 by Carbon. **K voprosu o vosstanovlenii Al_2O_3 uglerodom.** Zh. L. Vert, V. I. Kudriavtsev, and M. I. Sokhor. *Doklady Akademii Nauk SSSR,* v. 116, no. 5, Oct. 11, 1957, p. 834-837.

Reaction of Al_2O_3 with CO in a two-component mixture between 1500-1900 C and also in a mixture of Al_2O_3-C-TiC, in view of eliminating the effects of the intermediate products of TiO_2 reduction on the reaction.

4948* (German.) Vanadium(III) Hydroxide. **Über Vanadium(III)-hydroxyd.** N. Konopik and A. Neckel. *Monatshefte für Chemie,* v. 88, no. 5, Dec. 1957, p. 919-924.

Vanadium(III) hydroxide, with elimination of O, was produced in the form of a crystalline, bronze-colored, and easily oxidizable compound, by reducing sodium vanadate solution on a large-area Hg-cathode.

4949 Basic Chemistry of High Temperature Inorganic Systems Semiannual Progress Report, January-June, 1957. S. J. Yosim and T. A. Milne. *North American Aviation, Inc. (U. S. Atomic Energy Commission),* NAA-SR-2124, Dec. 1957, 37 p. (UF767 Un3.1na Contin.)

High temperature chemistry of Th, metal-metal salt systems, and ceramics.

4950* The Thermochemical Properties of the Oxides, Fluorides, and Chlorides to 2500°K. Alvin Glassner. Not paged. 1957. Available from Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. (QD515 Un3.2t Ref.)

4951 A Survey Report on Lithium Hydride: Supplement 1954-57. Charles E. Messer and Thomas R. P. Gibb, Jr. *Tufts University (U. S. Atomic Energy Commission),* NYO-8022, Aug. 1957, 18 p. (UF767 U3ny Contin.)

Supplements an earlier report of the authors, (NYO-3957, May 2, 1957), bringing the unclassified technological and scientific information on LiH up to date as of Aug. 1957.

4952* (German.) Preparation and Properties of Selenium-Dioxy-Difluorides, SeO_2F_2. **Darstellung und Eigenschaften des Selen-dioxy-difluorides, SeO_2F_2.** Alfred Engelbrecht and Bernhard Stoll. *Zeitschrift für Anorganische und Allgemeine Chemie,* v. 292, nos. 1-3, Nov. 1957, p. 20-24.

4953* (German.) Formation and Properties of Chlorographites. **Bildung und Eigenschaften des Chlorgraphits.** Robert Juza, Peter Jönck, and Arnold Schmeckenbecher. *Zeitschrift für Anorganische und Allgemeine Chemie,* v. 292, nos. 1-3, Nov. 1957, p. 34-45.

Interaction of Cl and graphite in the presence of Br, HCl, and H_2SO_4.

4954* (German.) Magnetic Study of the Effect of Halogens on Graphite. **Magnetische Untersuchungen zur Einwirkung der Halogene auf Graphit.** Robert Juza and Arnold Schmeckenbecher. *Zeitschrift für Anorganische und Allgemeine Chemie,* v. 292, nos. 1-3, Nov. 1957, p. 46-52.

By measuring the magnetic susceptibility of graphite a determination was made of the introduction of Cl into graphite, taking into account time, temperature, and amount of Cl participating in the reaction. Reaction was conducted in the presence of Br, HCl, and H_2SO_4.

4955* (German.) Study of Monohydrogen-Uranylphosphate $HUO_2PO_4\cdot 4\ H_2O$, and Monohydrogen-Uranylarsenate $HUO_2AsO_4\cdot 4\ H_2O$. **Zur Kenntnis von Mono-hydrogen-uranylphosphat $HUO_2PO_4\cdot 4\ H_2O$ und Mono-hydrogen-uranylarsenat $HUO_2AsO_4\cdot 4\ H_2O$.** Armin Weiss, Kurt Hartl, and Ulrich Hofmann. *Zeitschrift für Naturforschung,* v. 12b, no. 11, Nov. 1957, p. 669-671.

Preparation and properties.

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4956* (English.) **Studies on *Cyclo*propanes. I. Preparation and Properties of Some Hexasubstituted *Cyclo*propanes. II. Preparation and Properties of Some Penta- and Tetrasubstituted *Cyclo*propanes.** Gunnel Westöö. *Acta Chemica Scandinavica,* v. 11, no. 8, 1957, p. 1290 + 17 pages.

4957 Basicity Constants and Rates of Hydration of Some Imines. Gabriel J. Buist and Howard J. Lucas. *American Chemical Society, Journal,* v. 79, Dec. 5, 1957, p. 6157-6160.

The K_b values of a number of imines and their N-ethyl derivatives lie in the range 0.8 to 4.7 x 10^{-6} with the exception of *trans*-N-ethyl-2,3-iminobutane for which the value of 27 x 10^{-6} is inexplicably high. The perchloric acid-catalyzed rates of hydration of imines increase in the order: 1,2-iminoethane, 1,2-iminopropane, and 1,2,-imino-2-methylpropane.

4958 Molecular Rearrangements. XI. The Deamination of 1,1-Diphenyl-2-amino-1-propanol. Ben M. Benjamin, Howard J. Schaeffer, and Clair J. Collins. *American Chemical Society, Journal,* v. 79, Dec. 5, 1957, p. 6160-6164.

The rearrangement, in the presence of nitrous acid, of (+)- or (−)-1,1-diphenyl-2-aminopropanol stereospecifically labeled in only one of the two phenyls, produced α-phenylpropiophenone which underwent approximately 88% inversion (with 12% retention) at the migration terminus.

4959 Unsaturated Phenols. IV. Crotylphenols. Alfred R. Bader. *American Chemical Society, Journal,* v. 79, Dec. 5, 1957, p. 6164-6167.

Butadiene reacts with phenol in the presence of some Friedel-Crafts catalysts to yield largely a mixture of butenylphenols, with some higher phenols and ethers. Ortho- and *p*-crotylphenol are characterized.

4960 Phosphinemethylenes. III. A New Class of Azo Dyes Containing Phosphorus. Fausto Ramirez and Stephen Levy. *American Chemical Society, Journal,* v. 79, Dec. 5, 1957, p. 6167-6172.

Triphenylphosphoniumcyclopentadienylide couples readily with diazonium salts. The coupling reaction occurs at a position in the five-membered ring which preserves the stable cyclopentadienide system and which gives rise to the longest of the possible conjugated systems terminating at a P atom.

4961 Relationship of Structure to Properties of Diphosphopyridine Nucleotide and Other Pyridinium Compounds. Marvin R. Lamborg, Robert Main Burton, and Nathan O. Kaplan. *American Chemical Society, Journal*, v. 79, Dec. 5, 1957, p. 6173-6177.

4962 The Direct Preparation of Some Dihydro and Other Phenazine Derivatives. Henry Gilman and Joseph J. Dietrich. *American Chemical Society, Journal*, v. 79, Dec. 5, 1957, p. 6178-6179.

An improved yield of 5-methyl-10-phenyl-5,10-dihydrophenazine was obtained when tetrahydrofuran replaced ethylene glycol dimethyl ether.

4963 Hypotensive Agents. II. Aminoalkyl Esters of Piperidinecarboxylic Acids and Their "Reversed" Ester Derivatives. John H. Biel, Edwin P. Sprengeler, and Harris L. Friedman. *American Chemical Society, Journal*, v. 79, Dec. 5, 1957, p. 6184-6187.

Aminoalkyl and aminoalkynyl esters of the three isomeric N-alkylpiperidine-carboxylic acids were prepared as well as their "reversed" ester derivatives, amino acid esters of N-alkylpiperidyl alcohols.

4964 Studies on Diastereomeric α-Amino Acids and Corresponding α-Hydroxy Acids. IX. Configuration of the Isomeric γ-Hydroxyglutamic Acids. Leo Benoiton, Milton Winitz, Sanford M. Birnbaum, and Jesse P. Greenstein. *American Chemical Society, Journal*, v. 79, Dec. 5, 1957, p. 6192-6198.

An epimeric mixture of the two racemic modifications of γ-hydroxyglutamic acid was prepared via the sodium ethoxide-catalyzed condensation of ethyl acetamidocyanoacetate with ethyl α-acetoxy-β-chloropropionate, followed by acid hydrolysis of the condsenation product so derived.

4965 The Reaction of N-Benzylpyrrole With Acetylenedicarboxylic Acid. A Diels-Alder Addition to a Pyrrole. Leon Mandell and Wesley A. Blanchard. *American Chemical Society, Journal*, v. 79, Dec. 5, 1957, p. 6198-6201.

4966 Amino Derivatives of Nitrochalcones. II. A New Synthetic Method for 3-Aminoquinolines. Norman H. Cromwell and Gerald D. Mercer. *American Chemical Society, Journal*, v. 79, Dec. 5, 1957, p. 6201-6203.

Catalytic hydrogenation of α,β-di(*sec*-amino)-β-(2-nitrophenyl)-propiophenones gave good yields of 3 *sec*-amino-2-phenylquinolines, heretofore not readily available. Hydrogenation of β-amino-2-nitrochalcones resulted in 4-hydroxy-2-phenylquinoline.

4967 The Action of Diazoalkanes on Oxazolidine-4,5-diones. Glenn S. Skinner and Everett J. Wright. *American Chemical Society, Journal*, v. 79, Dec. 5, 1957, p. 6204-6207.

Diazomethane and diazoethane react with 2-dialkylmethyleneoxazolidine-4,5-diones to give a mixture of 2-dialkylmethylene-3-alkyloxazolidine-4,5-diones and the isomeric 2-dialkylmethylene-4-alkoxy-3-oxazolin-5-ones.

4968 Condensation of Monophenyl- and Diphenylguanidine With Malonates and α-Alkyl-α-carbethoxy-γ-butyrolactones. Glenn S. Skinner, Jeanetta M. Reneberger, and Herwart Curt Vogt. *American Chemical Society, Journal*, v. 79, Dec. 5, 1957, p. 6207-6209.

Both substituted malonic esters and α-alkyl-α-carbethoxy-γ-butyrolactones condense with monophenylguanidine in alcoholic sodium ethoxide to give 5,5-disubstituted 2-phenyliminobarbituric acids.

4969 Unsaturated Amines. XI. The Course of Formic Acid Reduction of Enamines. Nelson J. Leonard and Ronald R. Sauers. *American Chemical Society, Journal*, v. 79, Dec. 5, 1957, p. 6210-6214.

Study of the reduction of a model enamine, $\Delta^{1(10)}$-dehydroquinolizidine, with deuterium-labeled formic acid (DCOOH, HCOOD, DCOOD) shows that the proton of formic acid becomes attached to the β-carbon of the enamine grouping and that this step in the reduction process is reversible.

4970 The Synthesis and Stability of Acyl Radicals; Some Reactions of Diacyl Diimides. Richard Cramer. *American Chemical Society, Journal*, v. 79, Dec. 5, 1957, p. 6215-6219.

Acyl radicals appear to react as units below about 100 C rather than disintegrating to CO and alkyl radicals. There is also evidence that CO rapidly combines with simple alkyl radicals to yield acyl radicals.

4971 A New Synthesis of a Dioxadiene. R. K. Summerbell and Gregory J. Lestina. *American Chemical Society, Journal*, v. 79, Dec. 5, 1957, p. 6219-6221.

An alkyl substituted dioxadiene has been made for the first time. When *trans*-2,5-bis-(iodomethyl)-p-dioxane was treated with hot base, the elimination of the elements of HI produced a diolefin, 2,5-bis-(exomethylene)-*p*-dioxane.

4972 The Stereochemistry of Conjugate Additions. A Study of the Addition of Amines to (2-Nitropropenyl)-benzene. Philip L. Southwick and John E. Anderson. *American Chemical Society, Journal*, v. 79, Dec. 5, 1957, p. 6222-6229.

Pairs of diastereoisomeric *dl*-1-amino-2-nitro-1-phenylpropanes were obtained when the secondary amines morpholine, piperidine, or yprrolidine underwent addition to (2-nitropropenyl)-benzene.

4973 Interaction of Certain Grignard Reagents With Nitriles Containing an α-Morpholinyl Substituent. Henry R. Henze, George L. Sutherland, and George B. Roberts. *American Chemical Society, Journal*, v. 79, Dec. 5, 1957, p. 6230-6233.

The interaction of certain Grignard reagents with 4-morpholineacetonitrile, α-methyl-4-morpholineacetonitrile and α,α-dimethyl-4-morpholineacetonitrile was studied.

4974 Stereochemistry of the Primary Carbon. VIII. Acetolysis of Optically Active 1-Butyl-1-*d* *p*-Nitrobenzenesulfonate. Andrew Streitwieser, Jr. and William D. Schaeffer. *American Chemical Society, Journal*, v. 79, Dec. 5, 1957, p. 6233-6238.

The reaction of 1-butyl-1-*d* *p*-nitrobenzenesulfonate with acetic acid at 114 C gives butyl-1-*d* acetate with 85% net inverison of configuration (15% racemization). The ester is shown to be optically stable to the reaction conditions.

4975 The Decomposition of Peroxycarbamates and Their Efficiency as Initiators in Vinyl Polymerization. Eugene L. O'Brien, F. Marshall Beringer, and Robert B. Mesrobian. *American Chemical Society, Journal*, v. 79, Dec. 5, 1957, p. 6238-6242.

t-Butyl and cumyl N-phenylperoxycarbamates were prepared by the reaction of *t*-butyl and cumyl hydroperoxides with phenyl isocyanate, and *t*-butyl N-α-naphthylperoxycarbamate was prepared by the reaction of *t*-butyl hydroperoxide with α-naphthyl isocyanate.

4976 Free Radical Addition Reactions Involving Possible Rearrangement. Joseph Weinstock and Sheldon N. Lewis. *American Chemical Society, Journal*, v. 79, Dec. 5, 1957, p. 6243-6247.

The free radical addition of thiolacetic acid and butyl mercaptan to 3,3-diphenyl-1-butene proceeds with no detectable rearrangement. A similar addition of *n*-butyraldehyde goes with rearrangement to form 6,7-diphenyl-4-octanone.

4977 Transformations of Polyfluoroalkyl Iodides. Murray Hauptschein, Milton Braid, and Francis E. Lawlor. *American Chemical Society, Journal*, v. 79, Dec. 5, 1957, p. 6248-6253.

The coupling of primary and secondary perfluoroalkyl iodides was achieved in high yield by the use of ultra-violet irradiation in the presence of Hg.

4978 Meerwein Reactions on Isolated Olefinic Bonds. Free Radical Addition Reactions on Vinylsilanes. Robert A. Benkeser, Everett W. Bennett, and Richard A. Hickner. *American Chemical Society, Journal*, v. 79, Dec. 5, 1957, p. 6253-6256.

Aromatic diazonium salts add to vinyl groups attached to a Si atom under conditions typical for the Meerwein reaction. Since the latter is usually successful only with conjugated olefins, the reaction is diagnostic of the "conjugative nature" of a vinyl group joined to Si.

4979 An O-18 Tracer Study of the "Wet" and "Dry" Prevost Reactions. Kenneth B. Wiberg and Klaus A. Saegebarth. *American Chemical Society, Journal*, v. 79, Dec. 5, 1957, p. 6256-6261.

The reaction of *erythro*-1-benzoxy-2-bromo-1,2-diphenylethanecarbonyl-O^{18} with Ag benzoate under the conditions of the "dry" Prevost reaction followed by hydrolysis resulted in the formation of *meso*-hydrobenzoin having one-half the O-18 of the bromobenzoate.

4980 Dehydrohalogenation Products of Hexahydroterephthaloyl Chloride. A Bifunctional Ketene and a Bicyclo [2.2.1]-heptan-7-one Derivative. W. R. Hatchard and A. K. Schneider. *American Chemical Society, Journal*, v. 79, Dec. 5, 1957, p. 6261-6263.

Two new compounds were prepared by the dehydrohalogenation of hexahydroterephthaloyl chloride with triethylamine. With excess amine, the major product was 1,4-cyclohexanedimethenone, a crystalline reactive bisketene.

4981 Unsaturated Macrocyclic Compounds. IV. The Oxidation of Terminal Diacetylenes to Macrocyclic Tetraacetylenes. F. Sondheimer, Y. Amiel, and R. Wolovsky. *American Chemical Society, Journal*, v. 79, Dec. 5, 1957, p. 6263-6267.

The scope of the cyclization reaction of terminal diacetylenes, previously carried out with acta-1,7-diyne, was investigated. Nona-1,8-diyne and hepta-1.6-diyne give corresponding cyclic tetraacetylenes, the yields becoming better as the ring size decreases. In addition, compounds derived by linear coupling result.

4982 Intramolecular Substitution Reactions. X. The Hydrolysis of *trans*-4-Chlorocyclohexanol. Harold W. Heine. *American Chemical Society, Journal*, v. 79, Dec. 5, 1957, p. 6268-6270.

Establishes that 1,4-epoxycyclohexane is the main reaction product in the alkaline hydrolysis of *trans*-4-chlorocyclohexanol.

4983 Addition of Hydrogen Bromide to 1-Halocyclohexene and the Rearrangement of Dihalocyclohexanes in the Presence of Ferric Chloride. Harlan L. Goering and Leslie L. Sims. *American Chemical Society, Journal*, v. 79, Dec. 5, 1957, p. 6270-6274.

The ionic addition of HBr to 1-chlorocylcohexene and 1-bromocyclohexene in excess liquid HBr in the presence of a small amount of $FeCl_3$ gives 1-bromo-1-chlorocyclohexane and 1,1-dibromocyclohexane, respectively.

4984 Base-Catalyzed Elimination and Aromatization of a Cyclohexadieneamine and Its Methiodide. Charles R. Hauser and Donald N. Van Eenam. *American Chemical Society, Journal*, v. 79, Dec. 5, 1957, p. 6274-6277.

4985 Thermal and Acid Induced Aromatizations of an *exo*-Methylenecyclohexadieneamine With Alcohols. Relation to *ortho* Substitution Rearrangement. Charles R. Hauser and Donald N. Van Eenam. *American Chemical Society, Journal*, v. 79, Dec. 5, 1957, p. 6277-6279.

Two of the characteristic reactions of an *exo*-methylenecyclohexadieneamine, thermal isomerization to a β-arylethylamine and acid induced conversion to isodurene, were realized with certain alcohols and amines.

4986 Reactions of Methiodides of Certain *exo*-Methylenecyclohexadieneamies With Sodium Amide. Relation to *ortho* Substitution Rearrangement. Charles R. Hauser and Donald N. Van Eenam. *American Chemical Society, Journal*, v. 79, Dec. 5, 1957, p. 6280-6283.

The *exo*-methylenecyclohexadieneamine obtained from rearrangement of the 2,4,6-trimethylbenzyltrimethylammonium ion by means of sodium amide in liquid ammonia was converted to another *exo*-methyleneamine by further treatment of its methiodide with this reagent.

4987 The Rearrangement of Cyclohexene Oxides With Magnesium Bromide Etherate. Saiyid M. Naqvi, Jerome P. Horwitz, and Robert Filler. *American Chemical Society, Journal*, v. 79, Dec. 5, 1957, p. 6283-6286.

Cyclohexene oxide, 1-methylcyclohexene oxide, and 1-ethylcyclohexene oxide rearrange in the presence of magnesium bromide etherate at 0 and 60 C.

4988 Proximity Effects. X. *cis*-1,4-Cycloheptanediol From Solvolysis of Cycloheptene Oxide. Arthur C. Cope, Theodor A. Liss, and Geoffrey W. Wood. **XI. Reaction of *trans*-1,2-Dibromocycloheptane With Silver Acetate.** Arthur C. Cope, Edward M. Acton, Herbert E. Johnson, and Geoffrey W. Wood. *American Chemical Society, Journal*, v. 79, Dec. 5, 1957, p. 6287-6295.

4989 Studies in the Synthesis of the Antirachitic Vitamins. V. The Synthesis of 1-Cyclohexylidene 2-(5'-methoxy-2'-methylene-1'-cyclohexylidene)-ethane. Nicholas A. Milas and Charles P. Priesing. *American Chemical Society, Journal*, v. 79, Dec. 5, 1957, p. 6295-6299.

4990 Reaction of *keto*-Acetates With Diazomethane. M. L. Wolfrom, J. B. Miller, D. I. Weisblat, and A. R. Hanze. *American Chemical Society, Journal*, v. 79, Dec. 5, 1957, p. 6299-6303.

The reaction of diazomethane with *keto*-D-fructose pentaacetate and *keto*-L-sorbose pentaacetate yields 1,2-anhydroalditol acetates branched at C2.

4991 7-Keto Steroids. I. Steroidal 3-Hydroxy-3,5-dien-7-ones. II. Steroidal 3β-Hydroxy-Δ^5-7-ones and $\Delta^{9(11)}$-7-Ones. C. W. Marshall, Richard E. Ray, Ivar Laos, and Byron Riegel. *American Chemical Society, Journal*, v. 79, Dec. 5, 1957, p. 6303-6313.

4992 Steroidal Hormone Analogs. I. Synthesis of 18,19-Dinorprogesterone and 14-Hydroxy-18,19-dinorprogesterone. Norman A. Nelson and Robert B. Garland. *American Chemical Society, Journal*, v. 79, Dec. 5, 1957, p. 6313-6320.

A by-product at one point in the synthesis of this substance was used in the preparation of 18,19-dinorprogesterone (18,19-dinorpregn-4-ene-3,20-dione).

4993 The Actions of Borohydrides on Thiamin in Aqueous Medium. Guido E. Bonvicino and Douglas J. Hennessy. *American Chemical Society, Journal*, v. 79, Dec. 5, 1957, p. 6325-6328.

Thiamin is reduced by sodium borohydride to a tetrahydrothiamin and a dihydrothiamin. Sodium trimethoxyborohydride converts thiamin chiefly into a lower melting dihydrothiamin from which the higher melting isomer can be obtained.

4994 The Structures of β- and γ-Lumicolchicine. Ring-D Elaboration Products. Pete D. Gardner, Richard L. Brandon, and G. Rufus Haynes. *American Chemical Society, Journal*, v. 79, Dec. 5, 1957, p. 6334-6337.

Evidence is presented which suggests the stereochemical assignment of I-β and I-γ as the structures of β- and γ-lumicolchicine, respectively.

4995 Reactions of Methylene. I. Ethylene, Propane, Cyclopropane and *n*-Butane. H. M. Frey and G. B. Kistiakowsky. *American Chemical Society, Journal*, v. 79, Dec. 20, 1957, p. 6373-6379.

Methylene, produced photochemically from ketene in the gas phase, substitutes into the primary and secondary C-H bonds of propane and butane with a probability ratio of 1:1.7 at room temperature.

4996 Potential Purine Antagonists. VIII. The Preparation of Some 7-Methylpurines. Raj Nandan Prasad and Roland K. Robins. **IX. Further Studies of Some 4,6-Disubstituted Pyrazolo [3,4-d] pyrimidines.** Roland K. Robins. *American Chemical Society, Journal*, v. 79, Dec. 20, 1957, p. 6401-6415.

A new method of synthesis of 7-methyladenine and 7-methylhypoxanthine was accomplished.

4997 Carbobenzoxy Derivatives of Histidine, Imidazole and Benzimidazole. Abraham Patchornik, Arieh Berger, and Ephraim Katchalski. *American Chemical Society, Journal*, v. 79, Dec. 20, 1957, p. 6416-6420.

4998 Metabolite Analogs. VIII. Syntheses of Some Imidazopyridines and Pyridotriazoles. Harold Graboyes and Allan R. Day. *American Chemical Society, Journal*, v. 79, Dec. 20. 1957, p. 6421-6426.

Compounds are being screened for antimetabolite activity.

4999 Azo Compounds. Oxidation of 1,1-Disubstituted Hydrazines. The Synthesis and Oxidation of *cis*- and *trans*-1-Amino-2,6-diphenylpiperidine. A new Stereospecific Ring Closure. C. G. Overberger, Joseph G. Lombardino, and Richard G. Hiskey. *American Chemical Society, Journal*, v. 79, Dec. 20, 1957, p. 6430-6435.

5000 D-Homosteroids. I. Derivatives of D-Homoetiocholan-3a-ol-11,17a-dione. R. O. Clinton, R. G. Christiansen, H. C. Neumann, and S. C. Laskowski. *American Chemical Society, Journal*, v. 79, Dec. 20, 1957, p. 6475-6480.

A number of 11-oxygenated-D-homosteroids were synthesized from D-homoetiocholan-3a-ol-11,17a-dione. Several of these compounds possessed interesting endocrinological activity.

5001 Azulene. VII. A Study of the Beckmann Rearrangement of 1,3-Diacetylazulene Dioxime and 1,3-Diacetylazulene Dioxime Diacetate. Arthur G. Anderson, Jr., Charles G. Fritz, and Ralph Scotoni, Jr. *American Chemical Society, Journal*, v. 79, Dec. 20, 1957, p. 6511-6516.

Studies on the rearrangement of the dioxime and two geometric isomers of the dioxime diacetate included the characterization of all of the major products formed.

5002 The Preparation and Properties of Some Vinyl and Glycidyl Fluorethers. Mary L. Brey and Paul Tarrant. *American Chemical Society, Journal*, v. 79, Dec. 20, 1957, p. 6533-6536.

5003 The Separation and Amino Acid Composition of a Pure Phosphopeptone Prepared From β-Casein by the Action of Trypsin. R. F. Peterson, L. W. Nauman, and T. L. McMeekin. *American Chemical Society, Journal*, v. 80, Jan. 5, 1958, p. 95-99.

5004 Salt Effects and Ion Pairs in Solvolysis and Related Reactions. IX. The *threo*-3-*p*-Anisyl-2-butyl System. S. Winstein and G. C. Robinson. *American Chemical Society, Journal*, v. 80, Jan. 5, 1958, p. 169-181.

Ionization gives rise to the internally compensated *cis*-anisyl-bridged cation, from which racemic *threo*-acetate results on acetolysis.

5005 Chemical Effects of the Trifluoromethyl Group. V. Reactions of Ethyl β-Trifluoromethylglycidate; the Synthesis of 2-Amino-3-hydroxy-4,4,4-trifluorobutyric Acid. H. M. Walborsky and M. E. Baum. *American Chemical Society, Journal*, v. 80, Jan. 5, 1958, p. 187-192.

5006 On the Ultrasonic Clevage of Some Aromatic and Heterocyclic Rings. Douglas L. Currell and L. Zechmeister. *American Chemical Society, Journal*, v. 80, Jan. 5, 1958, p. 205-208.

In the presence of $AgNO_3$, certain halogen derivatives yield silver halide precipitates which contain silver acetylide, silver diacetylide, and AgCN. Similar cleavage reactions also can be realized in the absence of Ag with benzene, bromobenzene, phenol, tropolone, pyridine, and pyrrole.

5007* The Preparation of Aromatic Aldehydes. X. Benzaldehydes From Miscellaneous Compounds. Kurt Kulka. *American Perfumer and Aromatics*, v. 71, Jan. 1958, p. 51-53.

Oxidation cleavage of a propenyl group. Reductive desulfurization of thiol esters. Benzaldehydes from their diacetals.

5008* (German.) The Joint Effect of Elemental Sulfur and Gaseous Ammonia on Ketones. **Über die gemeinsame Einwirkung von elementarem Schwefel und gasförmigem Ammoniak auf Ketone. III.** The Synthesis of Dihydro- Δ^2-metathiazines by the Reaction of Gaseous Ammonia and Compounds Containing the Carbonyl Group on β-Mercaptoketones. **Die Synthese von Dihydro- metathiazinen-Δ^2 durch Einwirkung von gasförmigem Ammoniak und Oxogruppen enthaltenden Verbindungen auf β-Mercaptoketone.** Friedrich Asinger, Max Thiel, and Walter Höringklee. **IV.** The Joint Action of Sulfur and Ammonia on Acetone. **Die gemeinsame Einwirkung von Schwefel und Ammoniak auf Aceton.** Max Thiel and Friedrich Asinger. **V.** The Joint Effect of Sulfur and Ammonia on Methyl Ethyl Ketone. **Die gemeinsame Einwirkung von Schwefel und Ammoniak auf Methyläthylketon.** Friedrich Asinger, Max Thiel, and Inge Kalzendorf. **VI.** Preparation of Δ^2-Thiazolines Through the Joint Effect of Ammonia and Carbonyl Compounds on α-Mercaptoketones. **Die Herstellung von Thiazolinen-Δ^2 durch gemeinsame Einwirkung von Ammoniak und Oxo-Verbindungen auf α-Mercaptoketone.** Friedrich Asinger, Max Thiel, and Gerhard Esser. **VII.** Conversion of Δ^2-Thiazolines to Thiazoles by Means of Dehydration. **Die Dehydrierung von Thiazolinen-Δ^2 zu Thiazolen.** Friedrich Asinger, Max Thiel, and Lothar Schröder. *Annalen der Chemie*, v. 610, nos. 1-3, 1957, p. 1-56.

5009* The Catalytic Hydrogenation of Benzene and Toluene Over Evaporated Films of Nickel and Tungsten. J. R. Anderson. *Australian Journal of Chemistry*, v. 10, Nov. 1957, p. 409-416.

5010* (German.) Hydration of Ethene and Propene. **Die Hydratation von Äthen und Propen. II.** Hydration of Propene. **Die Hydratation von Propen.** J. Muller and H. I. Waterman. *Brennstoff-Chemie*, v. 38, nos. 23-23, Dec. 1957, p. 357-362.

The hydration of propene under different conditions with the use of silico tungstic acids as catalysts was studied. The reaction temperature was from 160 to 220 C, pressure from 14.5 to 37 atm., and the molar ratio of C_3H_6/H_2O was from 0.9 to 2.8.

5011 Characteristic Features of the Physics and Chemistry of Polycyclic and Non-Benzenoid Aromatic Substances. Pt. B. Chemical and Biological Properties. J. K. Brown, P. H. Given, V. Lupton, and W. F. Wyss. *British Coal Utilisation Research Association, Monthly Bulletin*, v. 21, Nov.-Dec. 1957, pt. 1, 31 p.

5012 Hydrogen Abstraction Reactions of Diphenylpicrylhydrazyl. A. G. Brook, R. J. Anderson, and J. Tissot Van Patot. *Canadian Journal of Chemistry*, v. 36, Jan. 1958, p. 159-166.

The stable free radical diphenylpicrylhydrazyl reacts quantitatively with NH_3 and hydrazine forming N and diphenylpicrylhydrazine, and less cleanly with hydroxylamine forming diphenylpicrylhydrazine and N_2O.

5013 The Synthesis of *w*-Deoxy-*w*-S-Ethyl-Polyols. J. K. N. Jones and D. L. Mitchell. *Canadian Journal of Chemistry*, v. 36, Jan. 1958, p. 206-211.

Treatment of an aldose diethyl thioacetal with Raney nickel catalyst resulted in the reductive cleavage of one thieothyl group. 1-Deoxy-1-S-ethyl derivatives of D-galactitol, L-arabitol, L-rhamnitol, and D-glucitol were thus synthesized and their structures proved.

5014 The Relation Between the Sulphate and Nitrogen Content of Unstabilized Cellulose Nitrate. Paul E. Gagnon, Karl F. Keirstead, and Brian T. Newbold. *Canadian Journal of Chemistry*, v. 36, Jan. 1958, p. 212-214.

5015 Ammonolysis of 1,2-Epoxycyclohexane and *Trans*-2-Bromocyclohexanol. L. R. Hawkins and R. A. B. Bannard. *Canadian Journal of Chemistry*, v. 36, Jan. 1958, p. 220-227.

Optimum conditions for the preparation of *trans*-2-aminocyclohexanol by this method are realized by use of a 20-fold excess of aqueous alcoholic ammonia at 100 C.

5016 Triarylmethane Compounds as Redox Indicators in the Schoenemann Reaction. III. The Dyes and Their Spectra. G. A. Grant, R. Blanchfield, and D. Morison Smith. *Canadian Journal of Chemistry*, v. 36, Jan. 1958, p. 242-250.

A series of triarylmethane dyes were made by varying the substituents in the thiophene ring of the dye [4-(*p*-dimethylamino-α-2-thienylbenzylidene)-2,5-cyclohexadiene-1-ylidene]-dimethylammonium chloride. The spectra of the Zn-salts of these dyes were shown to be similar to that of the dye formed in the Schoenemann reaction when the parent triarylmethane compound was used as an indicator.

5017 The Chemistry of Quaternized Hydrazine Compounds. Harry H. Sisler, George M. Omietanski, and B. Rudner. *Chemical Reviews*, v. 57, Dec. 1957, p. 1021-1047.

Survey of the chemical literature through 1954 covers the preparation and properties of those quaternary hydrazinium salts which are stable as such.

5018 The Oxidation of Aromatic Amines. V. Oxidation by Perphosphoric Acids. E. Boyland and D. Manson. *Chemical Society, Journal*, 1957, Dec., p. 4689-4694.

Aniline is oxidized to *p*-aminophenol and *p*-aminophenyl dihydrogen phosphate, 2-naphthylamine to 2-amino-1-naphthol and 2-amino-1-naphthyl dihydrogen phosphate; but *NN*-dimethyl-2-naphthylamine gives its *N*-oxide, and anthranilic acid yields azoxybenzene-2,2′-dicarboxylic and 5-hydroxyanthranilic acid.

5019 Alkenylation With Lithium Alkenyls. XIV. Syntheses in the *cyclo*Octene Series. E. A. Braude, W. F. Forbes, B. F. Gofton, R. P. Houghton, and E. S. Waight. **XV. The Formation and Some Reactions of 1-*cyclo*Decenyl-Lithium.** E. A. Braude and B. F. Gofton. *Chemical Society, Journal,* 1957, Dec., p. 4711-4723.

5020 Synthesis of Some 1:2-Benzophenanthridines. K. W. Gopinath, T. R. Govindachari, K. Nagarajan, and N. Viswanathan. *Chemical Society, Journal,* 1957, Dec., p. 4760-4765.

Syntheses of 7,2′,3′- and 6,2′,3′-trimethoxy-, 7-methoxy-2′,3′-methylenedioxy-, and 6-methoxy-2′,3′-methylenedioxy-9-methyl-1,2-benzophenanthridine are reported.

5021 Heterocyclic Compounds of Nitrogen. I. The Alkylation and Acylation of 3-Phenyloxindole, and the Preparation of Some Derivatives of 2-Hydroxy-3-phenylindole. J. Malcolm Bruce and F. K. Sutcliffe. *Chemical Society, Journal,* 1957, Dec., p. 4789-4798.

3-Phenyloxindole is alkylated at position 3, and acylated at position 1. 1-Substituted 3-phenyloxindoles are also alkylated at position 3, but acylation affords derivatives of 2-hydroxy-3-phenylindole.

5022 2:3-Derivatives of Naphthalene. III. The Electrophilic Substitution Reactions of 3-Nitro-2-naphthylamine and *N*-Acylated Derivatives. E. R. Ward, T. M. Coulson, and P. R. Wells. *Chemical Society, Journal,* 1957, Dec., p. 4816-4823.

Diazo-coupling, chlorination, bromination, and nitration reactions were studied.

5023 Pyrimidines. II. The Synthesis and Some Reactions of Pyrimidine-5-aldehydes. R. Hull. *Chemical Society, Journal,* 1957, Dec., p. 4845-4857.

5024 Amine Oxidation. II. Reactions of Aliphatic Tertiary Amines With Quinones. Detection of Dehydrogenation by the Formation of Coloured Dialkylaminovinylquinones. III. A Test Reaction for the Dehydrogenation of Triethylamine. The Reactions of Some Tertiary Amines With Benzoyl Peroxide. D. Buckley, Sonia Dunstan, and H. B. Henbest. **IV. Reactions of Tertiary Amines With *N*-Bromosuccinimide: the Formation of Aldehydes and Secondary Amines.** Sonia Dunstan and H. B. Henbest. *Chemical Society, Journal,* 1957, Dec., p. 4880 + 19 pages.

5025 The Synthesis of Condensed Heterocyclic Systems. I. Use of 2-Vinylthiophen in the Diene Synthesis. II. The Use of 3-Vinylthionaphthen and 3-*cyclo*Hex-1′-enylthionaphthen in the Diene Synthesis. W. Davies and Q. N. Porter. *Chemical Society, Journal,* 1957, Dec., p. 4958-4967.

5026 Reactions of the Phenylboron Chlorides and Bromides and the Chemistry of *n*-Butyl Phenylbromoboronite. E. W. Abel, W. Gerrard, and M. F. Lappert. *Chemical Society, Journal,* 1957, Dec., p. 5051-5054.

Diphenylboron halides do not react with ethers or Na. Phenylboron dibromide with *n*-butyl *tert.*-butyl ether gives *n*-butyl phenylbromoboronite and *tert.*- and *iso*-butyl bromide. Reaction of diphenylboron halides with boron halides, HBr, or Br at high temperature and pressure causes cleavage of B-C bonds.

5027* (German.) Acetylation Reactions. **Äthinierungsreaktionen. I.** Reaction of Cyclohexanediones With Acetylene. **Umsetzungen von Cyclohexandionen mit Acetylen.** Walter Ried and Hans-Joachim Schmidt. **II.** Reaction of Mono-substituted Acetylene Derivatives With Cyclohexanedione-(1,4) and Cyclohexanedione-(1,2). **Umsetzung von monosubstituierten Acetylen-Derivaten mit Cyclohexandion-(1.4) und Cyclohexandion-(1.2).** Walter Ried and Adam Urschel. **III.** Reaction of Quinones With Acetylene. **Umsetzung von Chinonen mit Acetylen.** Walter Ried and Hans-Joachim Schmidt. *Chemische Berichte,* v. 90, no. 11, 1957, p. 2499 + 19 pages.

5028* (German.) Aromatic Complexes of Metals. **Über Aromatenkomplexe von Metallen. XIII.** Chromium Tricarbonylbenzene. **Benzol-Chrom-Tricarbonyl.** Ernst Otto Fischer and Karl Öfele. *Chemische Berichte,* v. 90, no. 11, 1957, p. 2532-2535.

Preparation and properties.

5029* (German.) Study of the Cyclobutane Series. **Untersuchungen in der Cyclobutanreihe. III.** Benzocyclobutadiene. **Über Benzocylobutadien.** Costin D. Nenitzescu, Margarete Avram, and Doina Dinu. *Chemische Berichte,* v. 90, no. 11, 1957, p. 2541-2544.

By the treatment of 1,2-dibromo-benzocyclobutenes with lithium amalgam in ether solution the unstable benzocyclobutadiene compound is obtained.

5030* (German.) Pteridine. **Pteridine. I.** 2,4-Dioxo-tetrahydropteridine. **Über 2.4-Dioxo-tetrahydropteridine. II.** 7-Hydroxy- and 7-Hydroxy-6-methyl-2,4-dioxo-tetrahydropteridine. **Über 7-Hydroxy- und 7-Hydroxy-6-methyl-2.4-dioxo-tetrahydropteridine. III.** 2,4,6-Trioxo-hexahydropteridine and Its 7-Methyl Derivative Homolog. **Über 2.4.6-Trioxo-hexahydropteridine und die homologen 7-Methyl-Derivate. IV.** 7-Hydroxy-2,4-dioxo-tetrahydro-6-pteridine Carboxylic Acids. **Über 7-Hydroxy-2.4-dioxo-tetrahydropteridin-carbonsauren-(6). V.** 2,4,6-Trioxo-hexahydro-7-pteridine Carboxylic Acids. **Über 2.4.6-Trioxo-hexahydropteridin-carbonsaüren-(7). VI.** 2,4,6,7-Tetraoxo-octahydropteridine. **Über 2.4.6.7-Tetraoxo-oktahydropteridine.** Wolfgang Pfleiderer. *Chemische Berichte,* v. 90, no. 11, 1957, p. 2582-2638.

5031* (German.) Some 2-Ethyl-4,6-diphenyl-1,3,5-triazine Derivatives. **Über einige Derivate des 2-Äthyl-4.6-diphenyl-1.3.5-triazins.** Heinz Reinhardt and Erich Schiefer. *Chemische Berichte,* v. 90, no. 11, 1957, p. 2643-2645.

Monochloro- and monobromoethyl as well as dichloro- and dibromethyl compounds were prepared from 2-ethyl-4,6-diphenyl-1,3,5-triazine. The ethyl compound was transformed into 2-vinyl-4,6-diphenyl-1,3,5-triazine by means of thermal decomposition. By applying peroxides to the vinyl compound a high molecular polymer was produced.

5032* (German.) Synthesis of New Heterocyclic Mono- and Di-aldehydes. **Synthesen neuer heterocyclischer Mono- und Di-aldehyde.** Walter Ried and Richard M. Gross. *Chemische Berichte,* v. 90, no. 11, 1957, p. 2646-2649.

Conversion of activated methyl groups of the heterocyclic system to the corresponding aldehydes.

5033* (German.) Condensation Reactions of the *Meso*-Methyl Substituted Trimethinecyanine Dyes With Aromatic and Heterocyclic Aldehydes. **Kondensationsreaktionen von *meso*-methylsubstituierten Trimethincyaninfarbstoffen mit aromatischen und heterocyclischen Aldehyden.** Walter Ried and Rolf Bender. *Chemische Berichte,* v. 90, no. 11, 1957, p. 2650-2653.

5034* (German.) Investigation of Diazomethanes. **Untersuchungen an Diazomethanen. IX.** Synthesis of Diazomethane and Isodiazomethane. **Eine weitere neue Synthese von Diazomethan und von Isodiazomethan.** Eugen Müllen and Wolfgang Rundel. *Chemische Berichte,* v. 90, no. 11, 1957, p. 2673-2678.

Prepared by hydrolysis of diazomethyllithium.

5035* (German.) Alkynyl Compounds of the Transition Metals. **Alkinyloverbindungen von Übergangsmetallen. X.** Acetylides of Nickel(II). **Acetylenide von Nickel(II).** Reinhard Nast, Klaus Vester, and Hermann Griesshammer. *Chemische Berichte,* v. 90, no. 11, 1957, p. 2678-2682.

By the reaction of $Na_2[Ni(C{=}CR)_4]$ (R=H, CH_3, or C_6H_5) with $[Ni(NH_3)_6](SCN)_2$ in liquid ammonia in the absence of air, the compound $Ni(C{=}CR)_2{\cdot}4NH_3$ is obtained.

5036* (German.) Heterocyclic Seven-Ring Systems. **Über heterocyclische Siebenringsysteme. VIII.** Syntheses of Condensed 7-Member Heterocyclic Compounds With 1 Nitrogen and 1 Sulfur Atom. **Synthesen kondensierter 7-gliedriger Heterocyclen mit 1 Stickstoff- und 1 Schwefelatom.** Walter Ried and Wolfgang Marx. *Chemische Berichte,* v. 90, no. 11, 1957, p. 2683-2687.

Reaction of *o*-amino-thiophenol with α, β-unsaturated aromatic and heterocyclic ketones, β-ketonic esters, and with diketene.

5037 Oxidation of Secondary Alcohols by Chromium (VI) Oxide. J. Rocek and J. Krupicka. *Chemistry & Industry*, 1957, Dec. 28, p. 1668-1669.

The rate of oxidation of isopropyl alcohol was measured over a range of acidities extending from 5 to 55% aqueous H_2SO_4.

5038* (French.) Diethynyl Arenes. **Diéthynyl-arènes.** Wladyslaw Chodkiewicz, Paul Cadiot, and Antoine Willemart. *Comptes Rendus*, v. 245, no. 23, Dec. 4, 1957, p. 2061-2062.

The ethynylation of quinones by means of acetylene yielded the corresponding diquinols. Reducing these was an easy way to prepare diethynyl arenes.

5039* (Russian.) **Dipole Moments of Some Merocyanine Dyes of Rhodanine Derivatives. Dipolnye momenty nekotorykh merotsianinovykh krasitelei, proizvodnykh rodanina.** E. A. Shott-L'Vova, Ia. K. Syrkin, I. I. Levkoev, and Z. P. Sytnik. *Doklady Akademii Nauk SSSR*, v. 116, no. 5, Oct. 11, 1957, p. 804-807.

The heterodyne method was used to measure, in benzene at 25 C, dipole moments of dimethinemerocyanines, derivatives of 3-ethyl rhodanine, containing different nitrous heterocyclic residues.

5040* (German.) Synthesis of Long Chain Fatty Acids and Their Derivatives. **Die Synthese langkettiger Fettsäuren und ihrer Derivate. I.** Reaction of Fatty Acid Chlorides With Acetylene. **Die Umsetzung von Fettsäurechloriden mit Acetylen.** H. P. Kaufmann and W. Stamm. *Fette, Seifen, Anstrichmittel*, v. 59, no. 11, Nov. 1957, p. 946-953.

Preparation of fatty acid halides, their reaction with acetylene, and the analysis of by-products of this reaction.

5041* (Italian.) Complexes of Bivalent Metal Chlorides and Urea. **Complessi fra cloruri di metalli bivalenti ed ures.** Mario Nardelli, Antonio Braibanti, and Ines Chierici. *Gazzetta Chimica Italiana*, v. 87, no. 11, Nov. 1957, p. 1226-1231.

Cobalt chloride combined with four urea molecules, $ZnCl_2$ and $CdCl_2$ with two, and $HgCl_2$ with one. Cadmium chloride can also be bound to one urea molecule. X-rays revealed possible structural relationships between the complexes formed.

5042* (Italian.) 1,8-Dioxy-2,7-biphenylazo-3,6-naphthalenedisulfonic acid. **L'acido 1,8-diossi-2,7-bisfenilazo-3,6-naftalindisolfonico. IV.** Investigations of the Isodiazotates. **Ricerche sugli isodiazotati.** Giuseppe Adamo. *Gazzetta Chimica Italiana*, v. 87, no. 12, Dec. 1957, p. 1492-1498.

Preparation of the acid by coupling phenyldiazonium chloride with chromotrope 2R in a strongly alkaline environment. Analytical behavior of 2,7-biphenylazo acid.

5043* A Synthesis of Stillopsidin and Its Methyl Ethers. K. R. Laumas, S. Neelakantan, and T. R. Seshadri. *Indian Academy of Sciences, Proceedings*, v. 46, Nov. 1957, p. 343-348.

5044 The Promoted Air Oxidation of Benzene to Phenol in the Gas Phase. M. B. Donald and M. E. Darlington. *Industrial Chemist*, v. 34, Jan. 1958, p. 8-15.

Production of phenol by the air-oxidation of mixtures of cyclohexane and benzene. Effects of temperature, O concentration, surface area, and addition of water vapor.

5045* (Russian.) Synthesis of Vinyl Esters of Isobutyric, Isovaleric, and Caproic Acids. **O sinteze vinilovykh efirov izomaslianoi, izovalerianovoi i kapronovoi kislot.** E. N. Rostovskii, A. N. Rabinova, and A. I. Volkova. *Izvestiia Akademii Nauk SSSR, Otdelenie Khimicheskikh Nauk*, 1957, no. 11, Nov., p. 1379-1386.

A heterogeneous catalytic steam-phase method for synthesis of vinyl isobutyrate, vinyl isovalerate, and vinyl caproate from C_2H_2 and the corresponding acids. Seventy to 90% of the acid introduced in the reaction was recovered.

5046 Acrylamide. Its Preparation and Properties. E. L. Carpenter and H. S. Davis. *Journal of Applied Chemistry*, v. 7, Dec. 1957, p. 671-676.

5047 Dehydration of *cis*- and *trans*-2-Phenylcyclohexanols. Ernest L. Eliel, Joseph W. McCoy, and Charles C. Price. *Journal of Organic Chemistry*, v. 22, Dec. 1957, p. 1533-1539.

The dehydration of *trans*-2-phenylcyclohexanol by 85% phosphoric acid was reinvestigated using infra-red, ultra-violet, and mass spectrometry to ascertain the composition of the products.

5048 Ozonolysis of Cyclohexene in Methanol. Philip S. Bailey. *Journal of Organic Chemistry*, v. 22, Dec. 1957, p. 1548-1551.

Yielded polymers of the expected methoxy hydroperoxide.

5049 1,5 - Diaryl-2,3-pyrrolidinediones. VIII. Synthesis and Structure Proof. IX. Reassignment of Structure. X. Phenylhydrazine Derivatives. Walter L. Meyer and Wyman R. Vaughan. *Journal of Organic Chemistry*, v. 22, Dec. 1957, p. 1554-1567.

5050 Preparation and Physical Properties of Sulfur Compounds Related to Petroleum. VII. 2-, 6- and 8-Thiabicyclo [3.2.1]octane and 2-Thiabicyclo[2.2.2]octane. Stanley F. Birch, Ronald A. Dean, Neville J. Hunter, and Edmund V. Whitehead. *Journal of Organic Chemistry*, v. 22, Dec. 1957, p. 1590-1594.

2-, 6-, And 8-thiabicyclo[3.2.1]octane and 2-thiabicyclo[2.2.2] octane were synthesized and their physical properties recorded.

5051 Cycloalkyl- and Secondary Alkyltin Compounds and Their Cleavage by Iodine in Benzene Solution. Dietmar Seyferth. *Journal of Organic Chemistry*, v. 22, Dec. 1957, p. 1599-1602.

The preparation of $(cyclo\text{-}C_5H_9)_2SnR_2$ and $(cyclo\text{-}C_6H_{11})_2SnR_2$ (R = Me, *n*-Bu, C_6H_5), $(sec.\text{-}Bu)_2SnMe_2$, $(iso\text{-}Pr)_2SnR_2$ (R = Me, *n*-Bu), and $n\text{-}Bu_2SnMe_2$.

5052 Synthesis of Pseudoionone Homologs and Related Compounds. Walter Kimel, et al. *Journal of Organic Chemistry*, v. 22, Dec. 1957, p. 1611-1618.

A series of ketones related to 6-methyl-5-hepten-2-one were prepared in which substitutions were effected at carbon atoms 3, 4, 5, and 6. These ketones were converted to the corresponding pseudoionones.

5053 Cinnamic and 2-Thienylacrylic Derivatives. Alberto Vecchi and Gaetano Melone. *Journal of Organic Chemistry*, v. 22, Dec. 1957, p. 1636-1640.

As a further development of previous studies on two exceptionally active antibacterial substances, β-(5-nitro-2-thienyl)-acrolein and its α-bromo derivative, the effects of introducing a 5-cyano group instead of the 5-nitro group and of a nitro instead of the aldehyde group were studied.

5054 Syntheses and Absorption Spectra of *cis*- and *trans*-9,10 - Diaryl-9,10-dihydro - 9,10 - phenanthrenediols. Emil J. Moriconi, Friedrich T. Wallenberger, Lester P. Kuhn, and William F. O'Connor. *Journal of Organic Chemistry*, v. 22, Dec. 1957, p. 1651-1658.

Each *cis-trans* isomeric pair was configurationally related by oxidation to the same 2,2'-diaroylbiphenyl, and conversion to the same acid-catalyzed rearrangement product.

5055 *gem*-Dinitro Esters. I. Preparation and Some Reactions of α-Hydroxy-β, β-Dinitropropionic and -Butyric Acids. L. W. Kissinger, W. E. McQuistion, M. Schwartz, and Leon Goodman. *Journal of Organic Chemistry*, v. 22, Dec. 1957, p. 1658-1662.

5056 Improved Preparation of Diethyl Oximino-, Formamido- and Acetamidomalonates. Kenneth N. F. Shaw and Chris Nolan. *Journal of Organic Chemistry*, v. 22, Dec. 1957, p. 1668-1670.

Diethyl malonate was converted by the action of $NaNO_2$ and acetic acid to diethyl oximinomalonate, which was isolated in 93% yield as a crystalline 3:1 addition compound with sodium acetate.

5057 Reactions of Hydrogen Peroxide. II. A Novel Use of Selenium Dioxide as Catalyst for the Ring Contraction of Cycloalkanones to Cycloalkanocarboxylic Acids. III. Tungstic Acid Catalyzed Hydroxylation of Cyclohexene in Nonaqueous Media. George B. Payne and Curtis W. Smith. *Journal of Organic Chemistry*, v. 22, Dec. 1957, p. 1680-1685.

5058* (German.) Syntheses of Compounds Having a Constitutional Relationship With Emetine. **Synthesen von Verbindungen mit konstitutioneller Beziehung zum Emetin. VII.** Synthesis of Rubremetinium Bromide. **Synthese des Rubremetiniumbromides.** M. Pailer and G. Beier. *Monatshefte für Chemie*, v. 88, no. 5, Dec. 1957, p. 830-841.

Synthesis of *d,l*-rubremetinium bromide. Identity of the UV absorption with the *d*-rubremetinium bromide prepared from natural emetine by dehydration.

5059* (German.) The Catalytic Hydration of Quinols. **Über die katalytische Hydrierung von Chinolen.** A. Siegel and H. Bröll-Keckeis. *Monatshefte für Chemie*, v. 88, no. 5, Dec. 1957, p. 910-918.

Hydroaromatic compounds are formed by catalytic hydration of free quinols with H absorption.

5060 The Synthesis of Biphenyl-2,2', 4,4', 6,6'-d_6. J. M. Scarborough. *North American Aviation, Inc. (U. S. Atomic Energy Commission)*, NAA-SR-2144, Dec. 1957, 11 p. (UF767 Un3.1na Contin.)

Aniline hydrobromide with D_2O to yield aniline-N,N,2,4,6-d_5 hydrobromide-d which is converted to bromobenzene-2,4,6-d_3. Bromobenzene-2,4,6-d_3 is coupled in the presence of C_2H_5Br and $CoCl_2$ to form biphenyl-d_6.

5061 The Synthesis of Biphenyl-4,4'-d_2. R. I. Akawie. *North American Aviation, Inc. (U. S. Atomic Energy Commission)*, NAA-SR-2147, Dec. 1957, 12 p. (UF767 Un3.1na Contin.)

The synthesis of biphenyl-4,4'-d_2 from biphenyl by bromination to 4,4'-dibromobiphenyl, exchange with *n*-butylithium reagent, and hydrolysis with deuterium oxide is described.

5062* Investigations on the Transannular Effects in Elimination and Substitution Reactions by Tracer Techniques. Vladimir Prelog. *Record of Chemical Progress*, v. 18, no. 4, Dec. 1957, p. 247-260.

5063* (English.) **A General Theoretical Approach to the Course of Chemical Reduction, Electrochemical Reduction and Catalytic Hydrogenation of Hydrocarbons With Conjugated Double Bonds.** G. J. Hoijtink. *Recueil des Travaux Chimiques des Pays-Bas*, v. 76, no. 11, Nov. 1957, p. 885-906.

The course of reduction and hydrogenation of various conjugated hydrocarbons was investigated theoretically on the basis of a general ionic mechanism, considering benzene, naphthalene, anthracene, phenanthrene, pyrene, triphenylene, 1,2-benzanthracene, biphenyl, terphenyl, and quaterphenyl. In catalytic hydrogenation the primary reaction involves the addition of two electrons to the hydrocarbon molecule.

5064* (English.) **Chemistry of Acetylenic Ethers. XXVII. Reactions of 1,1-Diazido-1-ethoxyethane With Nucleophilic Reagents.** Y. A. Sinnema and J. F. Arens. **XXVIII. α,α-Dichlorodiethyl Ether and Its Use for the Preparation of Acyl Chlorides.** L. Heslinga, G. J. Katerberg, and J. F. Arens. *Recueil des Travaux Chimiques des Pays-Bas*, v. 76, no. 11, Nov. 1957, p. 949 + 25 pages.

Strong nucleophilic reagents rapidly substitute both azido groups. Weak nucleophiles require a reaction temperature of about 70 C. At this temperature N splits off from the diazide, so that side reactions may occur. Addition of two equivalents of HCl to ethoxyacetylene yields α,α-dichlorodiethyl ether.

5065* (English.) **Synthesis of Peptides by Means of Ethyl α-Chlorovinyl Ether and α,α-Dichlorodiethyl Ether.** L. Heslinga and J. F. Arens. *Recueil des Travaux Chimiques des Pays-Bas*, v. 76, no. 11, Nov. 1957, p. 982-995.

Synthesis of peptides by refluxing mixtures of an acylamino acid, an amino acid ester-hydrochloride, and a chlorinated ether in ethyl acetate. Optically pure acyl peptide-esters are obtained.

5066* (Italian.) Electronic Transformations of Liquid Hydrocarbons. **Trasformazioni chimiche provocate da scariche impulsive su idrocarburi liquidi.** Ugo Tiberio, Mario Mancianti, Giovanni Salardi, and Marcello Piazzi. *Ricerca Scientifica*, v. 27, no. 10, Oct. 1957, p. 3063-3079.

Experimental data obtained by treating paraffinic hydrocarbons with repeated short high-power unidirectional electric pulses. The pulses modify energy levels of some valence electrons, resulting in an effect similar to thermal cracking.

5067* Polyoxyethylene Emulsifying Agents. *Soap, Perfumery and Cosmetics*, v. 31, Jan. 1958, p. 51-53.

Some properties and application of both ether and ester types.

5068 The Terpenes. v. V. The Triterpenes and Their Derivatives: Hydroxy Acids, Hydroxy Lactones, Hydroxyaldehydo Acids, Hydroxyketo Acids and the Stereochemistry of the Triterpenes. John Simonsen and W. C. J. Ross. 662 p. 1957. Cambridge University Press, London. (QD416 Si56t2)

Theoretical chemistry; structure and properties.

5069* (German.) Preparation of Benzene-diphenyl-chromium Iodide by Means of the Friedel-Crafts Reaction. **Darstellung von Benzol-diphenyl-chrom(1)-jodid mittels der reduzierenden Friedel-Crafts-Reaktion.** Fr. Hein and K. Eisfeld. *Zeitschrift für Anorganische und Allgemeine Chemie*, v. 292, nos. 1-3, Nov. 1957, p. 162-166.

5070* (Russian.) Synthesis of Silico-Organic Compounds. **Issledovanie v oblasti sinteza kremniiorganicheskikh soedinenii. IV.** Hydrolysis of Dimethyldichlorosilane by Methyl Alcohol Resulting in Formation of Linear Polysiloxanes and Methyl Chloride. **Gidroliz dimetildikhlorsilana metilovym spirtom s obrazovaniem lineinykh polisiloksanov i khlorstogo metila.** V. S. Fikhtengol'ts, A. L. Klebanskii, and K. A. Rzhendzinskaia. *Zhurnal Obshchei Khimii*, v. 27, no. 11, Nov. 1957, p. 2984-2989.

5071* (Russian.) Thermal Isomerization of Allylarylsulfides. **O termicheskoi izomerizatsii allilarilsul'fidov.** E. N. Karaulova, D. Sh. Meilanova, and G. D. Gal'pern. *Zhurnal Obshchei Khimii*, v. 27, no. 11, Nov. 1957, p. 3034-3040.

Allylarylsulfides isomerize into corresponding propenylarylsulfides on heating. Allyl-*o*-tolylsulfide, allyl-*o*-tolylsulfone, propenyl-*o*- and *p*-tolylsulfides, propenyl-*o*-tolylsulfone, *cis*- and *trans*- propenylphenylsulfones were prepared for the first time.

See also: **4690** (structure of casimiroa); **4727** (alkaloid chemistry); **4753** (terpene chemistry progress); **6114** (lignin dimethyl sulfide); **6115** (levulinic acid utilization).

CHEMISTRY—PHYSICAL

5072* (English.) **Studies in Magnetochemistry. XVIII. The Magnetic Properties of Manganous Complexes.** R. W. Asmussen and H. Soling. *Acta Chemica Scandinavica*, v. 11, no. 8, 1957, p. 1331-1339.

Temperature dependence of the susceptibility in the interval 85-295 K is studied for Mn(II)-bis-salicylaldehyde, Mn(II)-bis-salicylaldehyde-ethylenediimine, and Mn(II)-bis salicylaldehyde-*o*-phenylenediimine.

5073* (English.) **The Infra-Red Absorption Spectra of Some Amide- and Dipeptide-Metal Chelates.** Andreas Rosenberg. *Acta Chemica Scandinavica*, v. 11, no. 8, 1957, p. 1390-1404.

Changes in the infra-red absorption spectra of amino acid amides and dipeptides after chelate formation with Cu(II) are interpreted as a result of the shift in the resonance equilibrium of the peptide group.

5074 Binuclear Iron Carbonyls and Their Significance as Catalytic Intermediates. Heinz W. Sternberg, Raymond Markby, and Irving Wender. *American Chemical Society, Journal*, v. 79, Dec. 5, 1957, p. 6116-6121.

The chemical and catalytic properties of solutions obtained by treating $Fe(CO)_5$ with aqueous alkali are explained.

5075 Studies on Oxidation-Reduction Mechanism. II. The Anodic Oxidation of *p*-Aminophenol. William K. Snead and A. Edward Remick. *American Chemical Society, Journal*, v. 79, Dec. 5, 1957, p. 6121-6127.

The anodic oxidation of *p*-aminophenol at *p*H 1.18 was studied with Pt electrodes in an electrolytic cell through which flowed a small a.c. superimposed on a relatively large constant d.c. Both a.c. and d.c. voltages were obtained as functions of time by using a recording voltmeter.

5076 The Reaction of Neutral Esters of Trivalent Phosphorus Acids With Inorganic Acid Chlorides. I. The Reaction of Trialkyl Phosphites With Sulfuryl Chloride. Algirdas C. Poshkus and John E. Herweh. *American Chemical Society, Journal*, v. 79, Dec. 5, 1957, p. 6127-6129.

Dialkyl phosphorochloridates, SO_2, and alkyl chlorides are formed.

5077 Cross Sections for Ionization by Electrons. F. W. Lampe, J. L. Franklin, and F. H. Field. *American Chemical Society, Journal*, v. 79, Dec. 5, 1957, p. 6129-6132.

Cross sections for ionization by 75 v. electrons were measured for 35 substances using the ion source of a CEC model 21-620 mass spectrometer.

5078 Nuclear Magnetic Resonance and Infrared Study of Hindered Rotation in Nitrosamines. Catharine E. Looney, W. D. Phillips, and E. L. Reilly. *American Chemical Society, Journal*, v. 79, Dec. 5, 1957, p. 6136-6142.

Concludes that the barrier to rotation in nitrosamines arises primarily as the result of partial double bond character of the N-N bond. Separate resonances are observed for the *cis* and *trans* isomers of benzylmethylnitrosamine.

5079 Dipole Moment and Steric Strain in Hexaaryldisilanes. Anthony J. Petro and Charles P. Smyth. *American Chemical Society, Journal*, v. 79, Dec. 5, 1957, p. 6147-6149.

The dipole moments of 1,1,2-triphenyl-1,2,2-tri-*p*-tolyldisilane, 1,1,1-triphenyl-2,2,2-tri-*p*-tolyldisilane, and 1,1,1-triphenyl-2,2,2-trimethyldisilane were determined in dilute benzene.

5080 Thermal Analysis of the Ferrous Chloride-Potassium Chloride System. Harry L. Pinch and Jack M. Hirshon. *American Chemical Society, Journal*, v. 79, Dec. 5, 1957, p. 6149-6150.

The phase diagram for the system $FeCl_2$-KCl is presented. Two intermediate compounds exit: $KFeCl_3$ with a congruent melting point of 399 C and K_2FeCl_4 with an incongruent melting point of 380 C.

5081 The Thermodynamics of Ionization of Amino Acids. IV. The First Ionization Constants of Some Glycine Peptides. Edward J. King. *American Chemical Society, Journal*, v. 79, Dec. 5, 1957, p. 6151-6156.

The thermodynamic functions for the ionization of the carboxyl groups of glycylglycine, glycyl-DL-alanine, glycyl-DL-α-amino-*n*-butyric acid, glycyl-L-leucine, glycyl-DL-serine, and glycylasparagine were obtained at ten temperatures from measurements on cells without liquid junction.

5082 The Kinetics of the Disproportionation of Plutonium(V). Sherman W. Rabideau. *American Chemical Society, Journal*, v. 79, Dec. 20, 1957, p. 6350-6353.

A study of Pu(V) in perchlorate solutions of unit ionic strength.

5083 The Hydrogen Peroxide-Induced Ce*(III)-Ce(IV) Exchange System. Paul B. Sigler and B. J. Masters. *American Chemical Society, Journal*, v. 79, Dec. 20, 1957, p. 6353-6357.

The technique of isotopic exchange in non-stable systems was applied to a study of the kinetics of the reaction between Ce(IV) and H_2O_2 in 0.8 *N* H_2SO_4 solution.

5084 Nernst-Controlled Currents in Hanging-Drop Polarography. William H. Rinmuth. *American Chemical Society, Journal*, v. 79, Dec. 20, 1957, p. 6358-6360.

An equation for the current at a concentration-polarized spherical electrode is derived.

5085 The Solubility of Water in Molten Mixtures of LiCl and KCl. William J. Burkhard and John D. Corbett. *American Chemical Society, Journal*, v. 79, Dec. 20, 1957, p. 6361-6363.

5086 C^{14} Hot Atom Chemistry of *n*-Pentane and Isopentane. C. F. MacKay and W. F. Libby. *American Chemical Society, Journal*, v. 79, Dec. 20, 1957, p. 6366-6369.

Reactions of C^{14} atoms of velocities corresponding to energies up to 40,000 e.v. were studied in liquid *n*-pentane and isopentane at room temperature.

5087 Electronic Spectra and Molecular Dimensions. II. The "Buttressing Effect" and Other Secondary Steric Interactions in Electronic Spectra. W. F. Forbes and W. A. Mueller. *American Chemical Society, Journal*, v. 79, Dec. 20, 1957, p. 6495-6500.

5088 Reactions of the Group VB Pentoxides With Alkali Oxides and Carbonates. VII. Heterogeneous Equilibria in the System Na_2O or Na_2CO_3-Nb_2O_5. Arnold Reisman, Frederic Holtzberg, and Ephraim Banks. *American Chemical Society, Journal*, v. 80, Jan. 5, 1958, p. 37-42.

5089 The Donor Characteristics of the Carbonyl Group. Denys Cook. *American Chemical Society, Journal*, v. 80, Jan. 5, 1958, p. 49-55.

Molecules containing the carbonyl group are examined in terms of the ionization potential, carbonyl stretching frequency, value of the fundamental stretching frequency of HCl, dissolved in such solvents, and the value of the acetylenic C-H stretching frequency of C_6H_5CCH in solution in such solvents.

5090 Reaction Kinetics by the Matrix Isolation Method: Diffusion in Argon; *cis-trans* Isomerization of Nitrous Acid. George C. Pimentel. *American Chemical Society, Journal*, v. 80, Jan. 5, 1958, p. 62-64.

5091 Free Radical Displacement Processes: Reactions of CH_3 and CD_3 Radicals With Crotonaldehyde and With Methyl Propenyl Ketone. J. N. Pitts, Jr., D. D. Thompson, and R. W. Woolfolk. *American Chemical Society, Journal*, v. 80, Jan. 5, 1958, p. 66-70.

5092 Diffusion Coefficients in Hydrocarbon Systems: Methane in the Liquid Phase of the Methane-*n*-Heptane System. H. H. Reamer and B. H. Sage. *A. I. Ch. E. Journal*, v. 3, Dec. 1957, p. 449-453.

Fick diffusion coefficients for methane were measured in the liquid phase of the methane-*n*-heptane system at temperatures between 40 and 340 F and pressures up to 3500 lb./sq. in.

5093 Thermal-Conductivity-Reduced-State Correlation for the Inert Gases. E. James Owens and George Thodos. *A. I. Ch. E. Journal*, v. 3, Dec. 1957, p. 454-461.

Fragmentary thermal-conductivity data for Ar available in the literature were correlated by use of a residual thermal conductivity $k - k^*$ vs. density ρ relationship.

5094 Vapor-Liquid-Equilibrium Data for the Ternary System Cyclohexane-Heptane-Toluene. H. S. Myers. *A. I. Ch. E. Journal*, v. 3, Dec. 1957, p. 467-472.

Equilibrium data and comparison of the activity coefficients with those predicted from the three limiting binaries.

5095 Heats of Vaporization of Hydrogen-Bonded Substances. A. Bondi and Donald J. Simkin. *A. I. Ch. E. Journal*, v. 3, Dec. 1957, p. 473-479.

A new method is proposed for the calculation of the heat of vaporization of hydroxylated compounds to an accuracy of about ±0.5 kcal./mole from no more data than the molecular structure and a boiling point.

5096 Vapor-Liquid Equilibria and Heat of Mixing: *n*-Octane-Ethylbenzene-Cellosolve System. P. S. Murti and Matthew Van Winkle. *A. I. Ch. E. Journal*, v. 3, Dec. 1957, p. 517-522.

5097 The Solubility of Quartz in Water at High Temperatures and Pressures. John A. Wood, Jr. *American Journal of Science*, v. 256, Jan. 1958, p. 40-47.

A theoretical equation for the solubility of quartz in supercritical water is set up, the chemical potentials of the participating components being evaluated by methods of statistical mechanics.

5098* (French.) Microwave Dispersion and the Hydrogen Bond in Some Alcohols. **Dispersion ultrahertzienne et liaison hydrogène dans quelques alcools.** P.-C. Brot. *Annales de Physique*, v. 2, ser. 13, nos. 9-10, Sept.-Oct. 1957, p. 714-763.

Measuring technique with 9, 3.17, and 1.18 cm. wavelengths. Experimental results. Separation of the dispersion into different fields. Intramolecular structure of the normal liquid alcohols.

5099* An Application of the Microelectrophoresis Method to the Study of the Surface Properties of Insoluble Oxides. P. G. Johansen and A. S. Buchanan. *Australian Journal of Chemistry*, v. 10, Nov. 1957, p. 398-403.

The variation with *p*H of the electrophoretic mobility of suspended particles was determined for Fe_2O_3, TiO_2, SnO_2, SiO_2, Al_2O_3, and for a number of synthetic aluminosilicates.

5100* Liquid-Vapour Equilibria. VIII. The Systems Acetone + Benzene and Acetone + Carbon Tetrachloride at 45°C. I. Brown and F. Smith. *Australian Journal of Chemistry*, v. 10, Nov. 1957, p. 423-428.

Equilibrium data are used to calculate the excess free energy of mixing for these systems.

5101* Chemistry of Polynuclear Compounds. I. The Infra-Red Spectra of Some Polynuclear Quinones and Polynuclear Aromatic Hydrocarbons. R. A. Durie, Ruth E. Lack, and J. S. Shannon. *Australian Journal of Chemistry*, v. 10, Nov. 1957, p. 429-447.

5102 (German.) Static and Dynamic Acidity. **Statische und dynamische Acidität.** F. Arndt. *Braunschweigischen Wissenschaftlichen Gesellschaft, Abhandlungen*, v. 8, 1956, p. 1-15. (Q3 B73a Vis.)

Acidity as defined by the equilibrium constant of dissociation in aqueous solution is termed "static acidity". Acidity as defined by the rate of proton release towards a standard proton acceptor is termed "dynamic acidity". Dynamic acidity is inversely proportional to the energy of adiabatic proton release and therefore parallels proton mobility, in contrast to static acidity which is increased by the resonance energy released in the anion through the removal of the proton.

5103 The Lower Excited States of Some Simple Molecules. R. S. Mulliken. *Canadian Journal of Chemistry*, v. 36, Jan. 1958, p. 10-23.

The rapidly increasing usefulness of good LCAO-MO calculations on the electronic states of simple molecules in the interpretation of observed excited states is pointed out. The observed and predicted states of, in particular, the $\pi^3\pi$ configurations of N_2 and CO are compared with those of C_2H_2 and HCN and with those of CO_2 and CS_2.

5104 Equivalent Orbitals and the Shapes of Excited Species. J. W. Linnett. *Canadian Journal of Chemistry*, v. 36, Jan. 1958, p. 24-30.

The electron distributions in the ground states of C_2H_2, HCO, and NH_2, and in one excited state of each species, were considered by transforming the simple molecular orbitals into equivalent ones.

5105 The Nature of Formaldehyde in Its Low-Lying Excited States. G. W. Robinson and V. Erdmanis DiGiorgio. *Canadian Journal of Chemistry*, v. 36, Jan. 1958, p. 31-38 + 3 plates.

Long path length, high resolution spectra in the near ultra-violet of H_2CO and D_2CO at -78 C were obtained, and further strong evidence in support of a non-planar excited state is presented.

5106 Excited States of the Molecular Ions of Hydrogen Fluoride, Hydrogen Iodide, Water, Hydrogen Sulphide, and Ammonia. D. C. Frost and C. A. McDowell. *Canadian Journal of Chemistry*, v. 36, Jan. 1958, p. 39-47.

5107 The Electronic Spectra of Crystalline Toluene, Dibenzyl, Diphenylmethane, and Biphenyl in the Near Ultraviolet. Robert Coffman and Donald S. McClure. *Canadian Journal of Chemistry*, v. 36, Jan. 1958, p. 48-58.

5108 Energy Transfer in Molecular Crystals and in Double Molecules. Donald S. McClure. *Canadian Journal of Chemistry*, v. 36, Jan. 1958, p. 59-71.

The theory of the transfer of electronic energy between two molecules, or between two parts of a "double molecule", is discussed for the case in which vibrational quanta are present.

5109 Diabatic Reactions. Henry Eyring, George Stewart, and Ransom B. Parlin. *Canadian Journal of Chemistry*, v. 36, Jan. 1958, p. 72-78.

Fundamentals of diabatic reactions. The two important types of radiationless transitions at the crossover region of two potential surfaces. Rate formulations.

5110 Reactions Involving Electronically-Excited Oxygen. E. Kerry Gill and K. J. Laidler. *Canadian Journal of Chemistry*, v. 36, Jan. 1958, p. 79-88.

5111 Some Effects of Intramolecular Vibrational Energy Transfer in Complex Fluorescent Molecules. B. Stevens. *Canadian Journal of Chemistry*, v. 36, Jan. 1958, p. 96-101.

It is suggested that continuous absorption be used as a criterion for the application of classical methods to intra- and intermolecular vibrational energy transfer in those cases where fluorescence emission is observed.

5112 Excited States of Acetylene and Their Role in Pyrolysis. G. J. Minkoff. *Canadian Journal of Chemistry*, v. 36, Jan. 1958, p. 131-136.

5113 Photolysis of Acetone in the Presence of Methyl-d_3 Acetate. M. H. J. Wijnen. *Canadian Journal of Chemistry*, v. 36, Jan. 1958, p. 176-179.

5114 The Study of Hydrogen Bonding and Related Phenomena by Ultraviolet Light Absorption. I. W. F. Forbes and J. F. Templeton. *Canadian Journal of Chemistry*, v. 36, Jan. 1958, p. 180-188.

5115 The Electric Moments of Some N,N'-Disubstituted Piperazines. M. V. George and George F. Wright. *Canadian Journal of Chemistry*, v. 36, Jan. 1958, p. 189-198.

5116 Absorption Spectra of the Halogen Monoxides. R. A. Durie and D. A. Ramsay. *Canadian Journal of Physics*, v. 36, Jan. 1958, p. 35-53.

Absorption spectra of ClO, BrO, and IO were observed during the flash photolysis of Cl_2-O_2, Br_2-O_2, and I_2-O_2 mixtures. Rotational and vibrational analyses of the ClO and BrO spectra were carried out and appropriate molecular constants derived.

5117 Pressure-Induced Infrared Absorption of Hydrogen and Hydrogen-Foreign Gas Mixtures in the Range 1500-5000 Atmospheres. W. F. J. Hare and H. L. Welsh. *Canadian Journal of Physics*, v. 36, Jan. 1958, p. 88-103.

The pressure-induced infra-red absorption of H was studied in pure H and in H-He, H-Ar, and H-N mixtures at pressures up to 5000 atm. at room temperature.

5118* The Vapour Pressure of di-*n*-Butylphthalate, di-*n*-Butylsebacate, Lauric Acid and Myristic Acid. Egil Hammer and Aksel L. Lydersen. *Chemical Engineering Science*, v. 7, nos. 1-2, 1957, p. 66-72.

Vapor pressures were measured in the pressure range of 0.1 to 13 mm. Hg.

5119* Interfacial Resistance, Adsorption and Interfacial Tension in Single Drop Liquid-Liquid Extraction. B. J. Melhus and S. G. Terjesen. *Chemical Engineering Science*, v. 7, nos. 1-2, 1957, p. 83-88.

Concludes that interfacial resistance and interfacial tension are two different manifestations of adsorption.

5120* Ternary Liquid Equilibria Systems: Acetone-Water-Esters. A. Venkataratnam, R. Jagannadha Rao, and C. Venkata Rao. *Chemical Engineering Science*, v. 7, nos. 1-2, 1957, p. 102-110.

Mutual solubility and tie-line data are presented for six ternary liquid-liquid systems containing acetone, water, and the esters methyl acetate, ethyl acetate, propyl acetate, amyl acetate, ethyl propionate and ethyl butyrate at 30 C.

5121 The Mesomorphic State. Liquid Crystals. Glenn H. Brown and Wilfrid G. Shaw. *Chemical Reviews*, v. 57, Dec. 1957, p. 1049-1157.

A survey of the literature on the mesomorphic state and the different methods used to attack the problem of the properties of this state.

5122 Valence Bonding in Nitrogen Compounds. W. J. Orville-Thomas. *Chemical Reviews*, v. 57, Dec. 1957, p. 1179-1211.

Characteristics of bonds; molecular orbital description of chemical bonds; valence states of the N atom; discussion of specific N compounds.

5123 Nucleophilic Substitution Reactions of Benzyl Halides. I. The Reaction of Benzyl Chloride With Partly Aqueous Solvents. B. Bensley and G. Kohnstam. *Chemical Society, Journal*, 1957, Dec., p. 4747-4754.

The heat capacity of activation for the solvolysis of benzyl chloride in 50% aqueous acetone and 50% aqueous ethanol was determined and possible reaction mechanisms are discussed.

5124 Photo- and Semi-Conductance in Organic Crystals. V. Ionized States in Molecular Crystals. L. E. Lyons. *Chemical Society, Journal,* 1957, Dec., p. 5001-5007.

The occurrence of ionized states in a molecular crystal such as naphthalene is discussed. Such states are estimated to lie at energy levels accessible with visible and ultra-violet light.

5125 The Chemistry of Silicon Carbide Surfaces. S. G. Clark and P. F. Holt. *Chemical Society, Journal,* 1957, Dec., p. 5007-5009.

A layer exists on SiC particles which dissolves more readily in dilute NaOH than the interior. The material of the layer exchanges with [Si^{31}] silicic acid. The surface of a SiC particle appears to resemble that of a quartz particle.

5126 Studies in the Pyrolysis of Organic Bromides. VII. The Maximally Inhibited Decomposition of *cyclo*Pentyl Bromide. M. N. Kale and Allan Maccoll. **VIII. Pyrolysis of *tert.*-Amyl Bromide.** G. D. Harden. **IX. The Pyrolysis of 2-Bromo-2:3-dimethylbutane.** G. D. Harden and Allan Maccoll. **X. The Inhibition of the Chain Mode of Decomposition With Special Reference to *n*-Propyl and *n*-Butyl Bromide.** Allan Maccoll and P. J. Thomas. *Chemical Society, Journal,* 1957, Dec., p. 5020-5041.

5127* (French.) Lead Nitrate Solutions in Molten Sodium Nitrate. **Sur les solutions de nitrate de plomb dans le nitrate de sodium fondu.** Yves Doucet and Christian Janot. *Comptes Rendus,* v. 245, no. 22, Nov. 25, 1957, p. 1898-1900.

The fall of the initial solidification point of $Pb(NO_3)_2$ solutions in molten $NaNO_3$ showed that these solutions obey the Schröder Van Laar law concerning ideal solutions. There was no configuration entropy, which explains the ideal state.

5128* (French.) Infra-Red Absorption Bands Due to Deformation Vibrations of the NH and NH_2 Groups in the Hydrazides of Carboxylic Acids. **Bandes d'absorption infrarouges dues à des vibrations de déformation des groupes NH et NH_2 chez les hydrazides d'acides carboxyliques.** Dušan Prevoršek. *Comptes Rendus,* v. 245, no. 23, Dec. 4, 1957, p. 2041-2044.

Study of the spectra between 3600 and 650 cm^{-1} and of their homologs, in the solid state and in solution.

5129* (French.) Paper Electrophoresis and Electroosmosis. **Électrophorèse sur papier et électroosmose.** Yvette Legoux and Serge de Mende. *Comptes Rendus,* v. 245, no. 23, Dec. 4, 1957, p. 2048-2051.

Experimental determination of the osmotic flow rate and coefficient of correction to be used in calculating ion mobility on paper.

5130* (Russian.) The Effect of Chlorine Admixtures on the Thermal Conductivity of Selenium. **O vliianii primesi khlora na teploprovodnost' selena.** G. M. Aliev and G. B. Abdullaev. *Doklady Akademii Nauk SSSR,* v. 116, no. 4, Oct. 1, 1957, p. 598-600.

The electrical and thermal conductivity of Se was studied on samples containing from 0.0035 to 0.250% Cl. Thermal conductivity of amorphous and crystalline Se decreases with the addition of Cl up to 0.03%, then increases slightly, and after 0.05% Cl remains constant.

5131* (Russian.) The Mechanism of Organic Glass Fusion. **O mekhanizme svarivaniia organicheskikh stekol.** N. A. Grishin, S. S. Voiutskii, and M. M. Gudimov. *Doklady Akademii Nauk SSSR,* v. 116, no. 4, Oct. 1, 1957, p. 629-632.

Plasticized as well as unplasticized polymethylmethacrylate containing 6% of dibutylphthalate were studied, indicating that the glass fusion is simply the diffusion of chain molecules and even whole regions from one sample to another.

5132* (Russian.) The Role of Hydrogen Atoms in the Catalytic Oxidation of Hydrogen on Palladium. **O roli atomov vodoroda v reaktsii kataliticheskogo okisleniia vodoroda na palladii.** V. B. Kazanskii and V. V. Voevodskii. *Doklady Akademii Nauk SSSR,* v. 116, no. 4, Oct. 1, 1957, p. 633-636.

The oxidation reaction occurs by the interaction of H atoms adsorbed on the catalyst surface with O.

5133* (Russian.) Coefficient of Separation for Mixtures Under High Vacuum Evaporation. **O koeffitsiente razdeleniia smesei pri isparenii v vysokom vakuume.** V. A. Maliusov, N. A. Malofeev, and N. M. Zhavoronkov. *Doklady Akademii Nauk SSSR,* v. 116, no. 4, Oct. 1, 1957, p. 660-663.

The system dibutylphthalate-dibutylazelate was studied in the temperature range from 60 to 120 C.

5134* (Russian.) A Spectroscopic Investigation of the NaCl $\rightleftarrows$ Na+Cl Reaction Equilibrium in the H_2+Cl_2 Flame and the Dissociation Energy of NaCl. **Spektroskopicheskoe issledovanie ravnovesiia reaktsii NaCl $\rightleftarrows$ Na + Cl v plameni H_2+Cl_2 i energiia dissotsiatsii NaCl.** L. V. Gurvich and I. V. Veits. *Doklady Akademii Nauk SSSR,* v. 116, no. 5, Oct. 11, 1957, p. 811-812.

5135* (Russian.) The Radiation Chemical Effect of Excitation Energy Transfer in Three-Component Solutions. **Radiatsionnokhimicheskii effekt perekhoda energii vozbuzhdeniia v trekhkomponentnykh rastvorakh.** V. A. Krongauz and Kh. S. Bagdasar'ian. *Doklady Akademii Nauk SSSR,* v. 116, no. 5, Oct. 11, 1957, p. 817-819.

Kinetics of the radiolytic decomposition of benzoyl peroxide in three-component solutions with wide intervals of phenanthrene concentration (0-1 mol/liter in three different benzoyl peroxide concentrations (0.0125; 0.0083; 0.0042 mol/liter).

5136 Heat of Formation of Titanium Tribromide by the Mercury Reduction of Titanium Tetrabromide. Elton H. Hall and John M. Blocher, Jr. *Electrochemical Society, Journal,* v. 105, Jan. 1958, p. 40-44.

5137 Emulsions: Theory and Practice. Paul Becher. 382 p. 1957. Reinhold Publishing Corp., New York. (TP156.E6 B38e)

Surface activity; physical properties of emulsions; theories of emulsion stability and manifestations of instability; chemistry of emulsifying agents; emulsion applications; demulsification; commercially available emulsifying agents.

5138* (German.) Behavior of the Hydrocarbon Oils in a Strong Electric Field. **Über das Verhalten der Kohlenwasserstofföle im elektrischen Kraftfeld.** Michael Freund and Gabriel Földiák. *Erdöl und Kohle,* v. 10, no. 11, Nov. 1957, p. 758-761.

Study of the changes occurring in different transformer, lubricating, and refined oils used as dielectrics in cylindrical condensers, between 6 and 10 kv. and from 500 to 1000 c.p.s.

5139 Dielectric Relaxation in Solid Hydrogen Halides. Robert H. Cole and Stephen Havriliak, Jr. *Faraday Society, Discussions,* no. 23, 1957, p. 31-38. (TK1 F22d Vis.)

Dielectric constant and loss measurements are summarized and discussed in relation to order-disorder phase transitions. Electrostatic calculations indicate the importance of dipole interactions for the structures and rates of molecular orientation in the low temperature phases.

5140 Dielectric Relaxation and the Electrical Conductivity of Ice Crystals. H. Granicher, C. Jaccard, P. Scherrer, and A. Steinemann. *Faraday Society, Discussions,* no. 23, 1957, p. 50-62. (TK1 F22d Vis.)

Results of previous and recent extended dielectric investigations on pure hexagonal ice crystals and on mixed-crystals containing HF acid are summarized. Quantitative electrolysis experiments demonstrate the ionic character of the electrical conductivity.

5141 Some Fundamental Aspects of the Mechanism of Diffusion in Crystals. K. Compaan and Y. Haven. *Faraday Society, Discussions,* no. 23, 1957, p. 105-112. (TK1 F22d Vis.)

Diffusion data yield two parameters, whereas for a molecular description more quantities are needed.

5142 The Chemical Effects of Radiative Thermal Neutron Capture. IV. The Kinetics of a Radical Recombination Process in Solids. M. M. De Maine, A. G. Maddock, and K. Taugböl. *Faraday Society, Discussions,* no. 23, 1957, p. 211-219. (TK1 F22d Vis.)

Kinetics of the slower stage of recombination of fragments produced by neutron capture in potassium chromate were studied. Results indicate a surprisingly small activation energy for the process.

5143 Molecular Vibrations of Group 6 Decafluorides. I. Infrared and Raman Spectra of Disulphur Decafluoride and Ditellurium Decafluoride. R. E. Dodd, L. A. Woodward, and H. L. Roberts. *Faraday Society, Transactions*, v. 53, Dec. 1957, p. 1545-1556.

5144 The Solubility of Mercury in Gases at Moderate Pressures. W. B. Jepson, M. J. Richardson, and J. S. Rowlinson. *Faraday Society, Transactions*, v. 53, Dec. 1957, p. 1586-1591

5145* (Italian.) Effect of the pH on the Hydration Velocity of Benzene in the Presence of Platinum Progressively Poisoned With Mercury. **Influenza del pH sulla velocità di idrogenazione del benzolo in presenza di platino gradualmente avvelenato con mercurio.** Bruno Foresti and Salvatore Musumeci. *Gazzetta Chimica Italiana*, v. 87, no. 11, Nov. 1957, p. 1317-1336.

Curves of activity of Pt-Pt cells gradually poisoned with $HgCl_2$. Curves resembled those obtained with Cu as a poison.

5146* (Italian.) Isotopic Exchange Reactions Between Ionic and Complex Cobalt. **Reazioni di scambio isotopico tra cobalto ionico e complessato.** Renato Barbieri, Umberto Belluco, and Maria Bruno. *Gazzetta Chimica Italiana*, v. 87, no. 12, Dec. 1957, p. 1393-1406.

Critical survey of the factors influencing isotopic exchange reactions. Isotope Co^{60} was used and the speed of exchange was measured for the system Co^{2+}-Co ethylenediaminetetraacetate. Absence of exchange for some systems is cited.

5147 (German.) Handbook of Catalysis. **Handbuch der Katalyse. v. V.** Heterogenic Catalysis. **Heterogene Katalyse. Pt. II.** G. M. Schwab, editor. 799 p. 1957. Springer-Verlag, Vienna. (QD501 Sch91h)

Contains articles on adsorption, mono- and multi-molecular layers, kinetics of heterogeneous catalysis, contact between mixtures, and active centers from the standpoint of reaction kinetics.

5148 Chemical Exchange. D. R. Augood. *Industrial Chemist*, v. 34, Jan. 1958, p. 16-26.

The nature of the chemical exchange process for separating isotopes. Important considerations are the equilibrium constant, rate of exchange, continuous countercurrent and multi-stage contact between reactants, and the problem of reflux.

5149 Selectivity in Chemical Reactions. H. I. Waterman and A. B. R. Weber. *Institute of Petroleum, Journal*, v. 43, Dec. 1957, p. 315-322.

The practical importance of functions predicting reaction courses for simultaneous reactions is pointed out. Simultaneous reactions are then distinguished into consecutive, side, and parallel reactions, and reaction courses are calculated for each of these selectivity types, assuming first-order kinetics.

5150* (Russian.) Adsorption Equilibria and Energy of Adsorption Forces. **Adsorbtsionnye ravnovesiia i energiia adsorbtsionnykh sil.** N. N. Avgul', et al. *Izvestiia Akademii Nauk SSSR, Otdelenie Khimicheskikh Nauk*, 1957, no. 11, Nov., p. 1314-1327.

A method for calculating the energy of absorption as the sum of energies of interaction of the force centers of the adsorbed molecule with all the force centers of the adsorbent. Effect of non-polar molecules on non-polar and ion adsorbents.

5151 Ternary Vapour-Liquid Equilibria: System Ethyl Methyl Ketone-Benzene-*Cyclo*hexane. P. Dakshinamurty and C. Venkata Rao. *Journal of Applied Chemistry*, v. 7, Dec. 1957, p. 654-659.

Isobaric vapor-liquid equilibrium data were determined at 760 mm. Hg total pressure using a modified Colburn still.

5152 Ternary Liquid Equilibria. IV. Various Systems. M. Raja Rao and C. Venkata Rao. *Journal of Applied Chemistry*, v. 7, Dec. 1957, p. 659-666.

Phase equilibrium data for acetic acid-water-hexane, ethylene glycol-water-*n*-butanol, ethylene glycol-water-ethyl methyl ketone, and ethyl methyl ketone-water-*cyclo*hexane systems.

5153 Vapour-Liquid Equilibria of Ethyl Acetate-Trichloroethylene System. M. Raja Rao, K. V. Kurmanadha Rao, and C. Venkata Rao. *Journal of Applied Chemistry*, v. 7, Dec. 1957, p. 666-671.

5154 The Vapor Pressure of Curved Surfaces. E. F. Hammel. *Journal of Chemical Education*, v. 35, Jan. 1958, p. 28-29.

5155 (French.) Kinetics and Mechanism of the Oxidation of Iodide by Means of Dissolved Oxygen. **Cinétique et mécanisme de l'oxydation de l'iodure par l'oxygène dissous.** J. Sigalla and C. Herbo. *Journal de Chimie Physique*, v. 54, no. 10, Oct. 1957, p. 733-738.

5156 (French.) Frequency Lowering in Hydrogen Halides When Passing From the Gaseous to the Dissolved State. Theoretical Study. **Abaissement des fréquences des halogénures d'hydrogène au passage de l'état gazeux a l'état dissous. Étude théorique.** Jean Lascombe and Marie-Louise Josien. *Journal de Chimie Physique*, v. 54, no. 10, Oct. 1957, p. 761-767.

5157 (French.) Part Played by Electrostatic Forces in the Behavior of Macromolecular Compounds in Aqueous Electrolytic Solutions. **Rôle des forces électrostatiques dans le comportement des composés macromoléculaires dans les solutions électrolytiques aqueuses.** Jean Néel. *Journal de Chimie Physique*, v. 54, no. 10, Oct. 1957, p. 768-775.

Disturbances that can be anticipated when the simple electrostatic field near an ion in solution is considered. Differential effect that can be produced on two types of molecules having different dielectrical properties.

5158 Correlation of Ultraviolet Absorption Spectra With Structure of α,β-Unsaturated Acids and Derivatives. Arnold T. Nielsen. *Journal of Organic Chemistry*, v. 22, Dec. 1957, p. 1539-1548.

For alicyclic and acyclic types each added alkyl substituent at the olefinic double bond produces a bathochromic shift of *ca.* 8-10 mμ.

5159 The Adsorption of Gases on Germanium Powder. R. M. Dell. *Journal of Physical Chemistry*, v. 61, Dec. 1957, p. 1584-1586.

At 25 C no chemisorption of H_2 or CO was observed on either reduced or oxidized Ge surfaces. Oxygen, however, was adsorbed readily at this temperature, the uptake obeying a logarithmic rate law.

5160 The Hydrolysis of Alkyl and Aryl Chlorosilanes. I. Conductometric Titration. II. Rates and Mechanism of Hydrolysis in Homogeneous Solution. L. H. Shaffer and E. M. Flanigen. *Journal of Physical Chemistry*, v. 61, Dec. 1957, p. 1591-1600.

5161 The Solubility of Iodine in Benzene-Carbon Tetrachloride Mixtures. Scott E. Wood, Burton D. Fine, and Leonard M. Isaacson. *Journal of Physical Chemistry*, v. 61, Dec. 1957, p. 1605-1611.

5162 The Effect of Temperature on Ion-Exchange Equilibria. I. The Sodium-Hydrogen and Cupric-Hydrogen Exchanges. O. D. Bonner and Linda Lou Smith. *Journal of Physical Chemistry*, v. 61, Dec. 1957, p. 1614-1617.

Temperature variation of equilibrium constants is believed to be caused primarily by the change of activity coefficients of the ions in the resin phase.

5163 The Dielectric Constant of Gases in the Region of Rotational Absorption Frequencies. James E. Boggs, Carol May Thompson, and Cullen M. Crain. *Journal of Physical Chemistry*, v. 61, Dec. 1957, p. 1625-1627.

Dielectric constants of cyanoacetylene and *t*-butyl iodide were determined in the gas phase at 42 C at frequencies from 8850 to 9500 Mc.

5164 The Self-Diffusion of Chloride Ion in Aqueous Alkali Chloride Solutions at 25°. Reginald Mills. *Journal of Physical Chemistry*, v. 61, Dec. 1957, p. 1631-1634.

5165 Heats of Precipitation of Some Metal 8-Hydroxyquinolates. Robert G. Charles. *Journal of Physical Chemistry*, v. 61, Dec. 1957, p. 1640-1643.

Heats of reaction are discussed in terms of the electronegativity of the bonded metal atoms and of the structures of the solid compounds formed.

5166 The Magnetic Susceptibilities of Dicyanamminenickel(II) and the Clathrate Compounds Thereof With Benzene and Pyridine. Michio Kondo and Masaji Kubo. *Journal of Physical Chemistry*, v. 61, Dec. 1957, p. 1648-1651.

5167 The Adsorption of Zinc(II) on Anion-Exchange Resins. I. The Secondary Cation Effect. R. A. Horne. **II. Stoichiometry, Thermodynamics, Loading Studies, Dowex-2 Adsorption and Factors Influencing the Rate of the Adsorption Process. III. The Adsorption From Bromide, Fluoride, Cyanide, Oxalate, Acetate, Nitrate, Phosphate, Sulfate, and Alkaline Media; the Perchlorate Effect, and the Adsorption From Mixed Solvent Media.** R. A. Horne, R. H. Holm, and M. D. Meyers. *Journal of Physical Chemistry*, v. 61, Dec. 1957, p. 1651-1665.

5168* Osmotic Pressure Measurements With Solute-Permeable Membranes. J. L. Gardon and S. G. Mason. *Journal of Polymer Science*, v. 26, Dec. 1957, p. 255-275.

After a certain time interval a plot of the logarithm of the indicated osmotic pressure against time yields a straight line which can be extrapolated to zero time. The true value of the initial osmotic pressure is calculated by correcting the extrapolated value for the rate of transfer of solute and solvent through the membrane and for the partition coefficient of the solute between the membrane and the solvent.

5169* Molecular Distributions in Polycondensations Involving Unlike Reactants. I. Gelation. Leslie C. Case. *Journal of Polymer Science*, v. 26, Dec. 1957, p. 333-350.

Criterion for gelation in polycondensations having like groups of unequal reactivity is that the expectation that a given structure will be propagated is unity, or greater. Several specific cases are treated.

5170* Effect of Olefin Structure on the Ceiling Temperature for Olefin Polysulfone Formation. R. E. Cook, F. S. Dainton, and K. J. Ivin. *Journal of Polymer Science*, v. 26, Dec. 1957, p. 351-364.

Ceiling temperatures were determined for the formation of polysulfones from a wide variety of olefins and allyl compounds under standard concentration conditions.

5171* (Hungarian.) Notes on the Determination of the Orientation of Monocrystals. **Megjegyzések egykristályok orientációjának meghatározásához.** László Korecz. *Magyar Fizikai Folyóirat*, v. 5, no. 5, 1957, p. 413-422.

Determination of orientation of ethylenediamine d-tartarate monocrystals by Laue images and their interpretation.

5172 (Hungarian.) Metal Catalysis in Technical Practice. **Fémkatalízis a műszaki gyakorlatban. II.** Determining the Characteristics of the Reactions. **A reakciók jellegének megállapítása.** Magyar Miklós. *Magyar Kémiai Folyóirat*, v. 63, no. 11, Nov. 1957, p. 302-309.

The velocity equations of Langmuir and Hinshelwood were transformed into integrable differential equations; the solutions of which were linearized and the measurements interpreted according to the corresponding coordinate system.

5173* (German.) Constitutional Diagram of the Aluminum Oxide/Water System. **Das Zustandsdiagramm des Systems Aluminiumoxyd/Wasser.** K. Torkar and H. Worel. *Monatshefte für Chemie*, v. 88, no. 5, Dec. 1957, p. 739-748.

Diagram based on thermochemical data. Comparison with reactions of the formation of $Al(OH)_3$. Formation of boehmite by dehydration of coarse trihydroxide and of gamma oxide by dehydration of finely divided trihydroxide.

5174* (German.) Quinolacetates and Related Compounds. The Ultraviolet Absorption of Cyclohexadienone Derivatives. **Chinolacetate und verwandte Verbindungen. Die Ultraviolettabsorption von Derivaten der Cyclohexadienone.** J. Derkosch and W. Kaltenegger. *Monatshefte für Chemie*, v. 88, no. 5, Dec. 1957, p. 778-792.

Distinction, based on UV-spectra, between *o*- and *p*-quinolacetates. Characteristic differences between *o*-quinolacetates and *o*-quinonediacetates. Relations between the dissolved material and the solvent.

5175 Applied Hydrocarbon Thermodynamics. I. A Review of Fundamentals. Wayne C. Edmister. *Petroleum Refiner*, v. 37, Jan. 1958, p. 173-178.
(To be continued.)

5176* The Diffusion of Hydrogen Through Palladium. A. S. Darling. *Platinum Metals Review*, v. 2, Jan. 1958, p. 16-22.
Survey of the work done in this field.

5177* (Polish.) Effect of Water, Several Lubricants, and Solvents on Some Physical Properties of the Surface of Organic Glass. **Wpływ wody i niektórych smarów i rozpuszczalników na pewne własności fizyczne powierzchni szkła organicznego.** P. Szota. *Przemysł Chemiczny*, v. 13, no. 12, Dec. 1957, p. 710-714.

High resistance of glass to water, some lubricants, and fractions of aliphatic hydrocarbons as depending upon purity of monomer applied in the organic glass manufacture. Its valuation should include testing of the resistance of surface against transparency examination by chemicals.

5178 Pure and Applied Physics. v. I. Electron Impact Phenomena and the Properties of Gaseous Ions. F. H. Field and J. L. Franklin. 349 p. 1957. Academic Press, New York. (QC721 F45e)

A critical review with primary emphasis on the chemical physics of various systems.

5179* (Russian.) Thermo-Chemical Reduction of Barium From Its Oxide by Various Activators. **Termokhimicheskoe vosstanovlenie bariia iz ego okisi razlichnymi aktivatorami.** Iu. S. Vedula and V. M. Gavriliuk. *Radiotekhnika i Elektronika*, v. 2, no. 12, Dec. 1957, p. 1519-1524.

An experimental study of the temperature dependence of Ba vapor pressure over the reaction of BaO with Mo, W, Si, Ta, and Ti.

5180* (English.) **A Kinetic Investigation of the Reaction Between Amides and Formaldehyde.** J. Ugelstad and J. DeJonge. *Recueil des Travaux Chimiques des Pays-Bas*, v. 76, no. 11, Nov. 1957, p. 919-945.

Kinetic measurement of the reaction between formaldehyde and the amides of carboxylic acids and urea. The formation of a methylol amide proceeds by a bimolecular reaction, while its decomposition is a monomolecular reaction. A mechanism for the reactions of formaldehyde with amides in general is proposed.

5181 Ultrasonic Dispersion in Gaseous Sulphur Dioxide. J. D. Lambert and R. Salter. *Royal Society, Proceedings*, v. 243, ser. A, Dec. 10, 1957, p. 78-83.

The velocity of ultrasonic waves was measured in gaseous SO_2 at 20, 102, and 200 C for values of f/p ranging from 200 $kcs^{-1}atm^{-1}$ to 7 $Mcs^{-1}atm^{-1}$. (f is the ultrasonic frequency, p the pressure.) Dispersion involving the major part of the vibrational specific heat was found at all temperatures. Each dispersion zone corresponds to two distinct relaxation times differing by a factor of ten.

5182 Ultrasonic Relaxation and the Vibrational Specific Heat of Liquid Sulphur Dioxide. R. Bass and J. Lamb. *Royal Society, Proceedings*, v. 243, ser. A, Dec. 10, 1957, p. 94-106.

Measurements were made of the absorption of ultrasonic waves in liquid SO_2 over the range of frequency from 3 to 45 Mc/s and at temperatures of 0, 25, and 50 C. A pronounced relaxation is found, centered about a frequency of approximately 23 Mc/s; this is associated with the time delay in deactivation of two of the three vibrational modes.

5183 A Method for the Direct Determination of the Rate Constants for Radical-Radical Interactions in the Gas Phase. I. The Technique of Investigation. II. The Rate Constant for the Recombination of Methyl Radicals. F. Moseley and J. C. Robb. *Royal Society, Proceedings*, v. 243, ser. A, Dec. 10, 1957, p. 119-142 + 1 plate.

5184 Vibrational Band Intensities in Substituted Anilines. P. J. Krueger and H. W. Thompson. *Royal Society, Proceedings*, v. 243, ser. A, Dec. 24, 1957, p. 143-153.

The infra-red absorption bands associated with the stretching vibrations of the NH_2 group in a series of *meta*- and *para*-substituted anilines were examined.

5185 Electrical Anharmonicity of the OH Group Vibration. R. Moccia and H. W. Thompson. *Royal Society, Proceedings*, v. 243, ser. A, Dec. 24, 1957, p. 154-159.

The intensities of the fundamental and overtone vibration bands of the OH group in some phenols and alcohols were determined.

5186 Non-Stoicheiometric Clathrate Compounds of Water. R. M. Barrer and W. I. Stuart. *Royal Society, Proceedings*, v. 243, ser. A, Dec. 24, 1957, p. 172-189.

Presents a statistical thermodynamic interpretation of the two structural types of clathrate phases of water.

5187 Heats of Adsorption on Evaporated Nickel Films. D. F. Klemperer and F. S. Stone. *Royal Society, Proceedings*, v. 243, ser. A, Jan. 14, 1958, p. 375-399.

The adsorption of O, H, and CO was studied on evaporated films of Ni prepared under varied conditions with a view to defining more precisely the differences in behavior between Ni films and Ni powder.

5188* (German.) Analysis of the Diffusion of Steam in High-Boiling Liquids. **Untersuchungen der Diffusion von Wasserdampf in hochsiedenden Flüssigkeiten.** Franz Gross. *Zeitschrift für Angewandte Physik*, v. 9, no. 12, Dec. 1957, p. 606-612.

The diffusion coefficients of steam were measured in Shell-oil K8 and paraffin oil under various conditions.

5189* (German.) Crystal Structure and Phases of Some Compounds of the Zirconium-Sulfur System. **Zur Kristallstruktur einiger Verbindungen und Phasen des Systems Zirkon/Schwefel.** Harry Hahn, Berhnard Harder, Ursula Mutschke, and Peter Ness. *Zeitschrift für Anorganische und Allgemeine Chemie*, v. 292, nos. 1-3, Nov. 1957, p. 82-96.

An X-ray study of the compounds ZrS_2, ZrS_2, ZrS, Zr_4S_5; a phase study of Zr_3S_4 and Zr_3S_2 within the composition range of $ZrS_{1.8-0.9}$ and $ZrS_{0.8-0.5}$ respectively.

5190* (German.) The Magnetochemistry of Uranium(V) Compounds. **Zur Magnetochemie der Uran(V)-verbindungen.** W. Rüdorff and W. Menzer. *Zeitschrift für Anorganische und Allgemeine Chemie*, v. 292, no. 4, Nov. 1957, p. 197-202.

Lithium uranate, $NaUO_3$, UCl_5, and $UCl_5.SOCl_2$ were tested magnetically. Both uranates follow the Curie-Weiss law with Δ=293 K and -242 K respectively. Solutions of UCl_5 in CCl_4 are diamagnetic.

5191* (German.) Inclusions of Solvents in Organic Be Salts. **Lösungsmitteleinschlüsse bei organischen Berylliumsalzen. III.** Beryllium Oxyacetate and Higher Alcohols. **Berylliumoxyacetat und höhere Alkohole.** Horst Dietrich Hardt. *Zeitschrift für Anorganische und Allgeneine Chemie*, v. 292, no. 4, Nov. 1957, p. 224-228.

Shows that the precipitation reaction is not due to a hydrolytic effect of water in solvents, and that the reaction is not connected with the changing specific resistivity of the alcoholic solution.

5192* (German.) Energy Transfer by Fluorescent Organic Solutions. **Energieübertragung bei der Fluoreszenz organischer Lösungen.** H. Knau. *Zeitschrift für Naturforschung*, v. 12a, no. 11, Nov. 1957, p. 881-886.

By measuring the decay time of anthracene and tetracene in different solutions in relation to their concentration, the mechanism and the duration of the energy transfer process could be determined.

5193* (German.) The $C^2\Sigma^+ \rightarrow A^2\Sigma^+$ Band System of OH. **Das $C^2\Sigma^+ \rightarrow A^2\Sigma^+$-Bandensystem von OH.** A. Michel. *Zeitschrift für Naturforschung*, v. 12a, no. 11, Nov. 1957, p. 887-896 + 1 plate.

A spectrum obtained through a jet of discharged steam between 2248 and 2600 A was photographed and analyzed.

5194* (German.) Measuring the Absolute Ferric Iron Recovery From Aqueous Ferrous Sulfate Solutions Under the Effect of X-Rays and Electron Radiations. **Messung der absoluten Eisen-III-Ausbeute von wässrigen Eisen-II-Sulfatlösungen bei Einwirkung von Röntgen- und Elektronenstrahlen.** R. Glocker, D. Messner, and S. Rösinger. *Zeitschrift für Physikalische Chemie (Frankfurt)*, v. 13, nos. 3-4, Nov. 1957, p. 129-139.

Determination of the number of ferric ions formed per 100 e.v. of absorbed energy for the X-ray wavelengths 1.54, 0.71, 0.56, and 0.15 Å, and for electron radiations of 15 m.e.v.

5195* (German.) Thermodynamic Properties of the System Nitrocellulose-Acetone. **Über die thermodynamischen Eigenschaften des Systems Nitrocellulose-Aceton.** H. Diener and A. Münster. *Zeitschrift für Physikalische Chemie (Frankfurt)*, v. 13, nos. 3-4, Nov. 1957, p. 202-222.

Determination of the dilution entropy of the system by measuring the osmotic pressure at 15 and 40 C in a mol. wt. range of 20,000 to 400,000.

5196* (Russian.) Kinetics and Mechanism of Tetramethylethylene Decomposition. **O kinetike i mekhanizme raspada tetrametiletilena.** A. D. Stepukhovich and E. E. Nikitin. *Zhurnal Fizicheskoi Khimii*, v. 31, no. 11, Nov. 1957, p. 2400-2402.

A possible explanation is proposed based on a heterogeneous-radical rather than a chain mechanism.

5197* (Russian.) A Study of Polarization in the Polarography of Thiocyanate Complexes of Nickel. **Issledovanie poliarizatsii pri poliarografirovanii rodanistykh kompleksov nikelia.** Ia. I. Tur'ian. *Zhurnal Fizicheskoi Khimii*, v. 31, no. 11, Nov. 1957, p. 2423-2427.

The polarization was investigated in relation to the concentration of KSCN. It was shown that at small thiocyanate concentrations (0.002-0.02*M*) three Ni waves are formed.

5198* (Russian.) The Mechanism of the Electro-Oxidation of Alcohols and Aldehydes on Platinum. Electro-Oxidation of Ethyl Alcohol. **O mekhanizme elektrookisleniia spirtov i al'degidov na platine. O mækhanike elektrookisleniia etilovogo spirta.** G. A. Bogdanovskii and A. I. Shlygin. *Zhurnal Fizicheskoi Khimii*, v. 31, no. 11, Nov. 1957, p. 2428-2434.

Electro-oxidation on Pt proceeds according to an electronic and radical mechanism without the participation of adsorbed O or surface compounds of O and Pt.

5199* (Russian.) Study of Conjugated Systems. **Issledovaniia v oblasti sporiazhennykh sistem. LXXX.** Infra-Red Spectra of Certain Acetylene and Vinylacetylene Alcohols. **Infrakrasnye spektry nekotorykh atsetilenovykh i vinilatsetilenovykh spirtov. LXXXI.** Infra-Red Spectra of Some α,β-Unsaturated Acetylene Aldehydes and Ketones. **Infrakrasnye spektry nekotorykh α,β-nepredel'nykh atsetilenovykh al'degidov i ketonov.** A. A. Petrov and G. I. Semenov. *Zhurnal Obshchei Khimii*, v. 27, no. 11, Nov. 1957, p. 2941-2951.

See also: **5826** (migration of Ba on metal surfaces); **5896** (nuclear reactions in fluorine); **5983** (electron density and X-ray spectra); **6039** (radiochemical degradation); **6117** (hydrogen-bonds in dyeing process).

COATINGS

5200* (Italian.) The Varnishing of Aluminum and of Its Alloys. **La verniciatura dell'alluminio e delle sue leghe.** *Alluminio*, v. 26, no. 11, Nov. 1957, p. 489-500.

Preliminary cleaning. Protection of parts exposed to sea atmosphere. Transparent varnish. Control of the varnished surfaces. Technical aspects of the major processes for the chemical oxidation of Al.

5201 Relationship Between Hydrogen Solubility and Reboiling Tendency in Enameling Steels. R. M. Hudson, J. K. Magor, and G. L. Stragand. *American Ceramic Society, Journal*, v. 41, Jan. 1958, p. 23-27.

Among low-carbon steels of similar composition that display differences in reboiling severity, the heavier reboiling areas are associated with lower H solubilities.

5202* (German.) About the Graining on Tin Plate. **Über die Maserung auf Weissblech.** Hans Eggers. *Archiv für das Eisenhüttenwesen*, v. 28, no. 12, Dec. 1957, p. 777-783.

Methods of graining electroplate or hot-dip coatings; microstructure; properties and composition of grained surfaces.

5203 Vapor Deposition of Molybdenum and Niobium Coatings on Stainless Steel Tubes. Carroll F. Powell, Danny M. Rosenbaum, Robert B. Palmer, and Ivor E. Campbell. *Battelle Memorial Institute (U. S. Atomic Energy Commission)*, BMI-1228, Oct. 1957, 7 p. (UF767 U3b Contin.)

Apparatus was developed for vapor depositing Mo on the outside of 0.1835-in.-OD by 20-in.-long Type 304 stainless steel tubing by H reduction of $MoCl_5$ or by thermal decomposition of molybdenum hexacarbonyl, both processes being carried out at reduced pressure. Apparatus also was made for vapor depositing Nb on the inside of the tubing by H reduction of $NbCl_5$.

5204 How High Temperature Ceramic Coatings Protect Aluminum. Paul A. Huppert. *Ceramic Industry*, v. 69, Nov. 1957, p. 64 + 2 pages.

Equipment, methods, and materials for surface protection.

5205* Ballast Tank Protection. K. V. Hodgson. *Corrosion Prevention and Control*, v. 4, Dec. 1957, p. 45-46.

Coal tar pitch incorporated in suitable media can be produced which possesses phenomenal water resistance and in addition, good electrical insulation. Its adhesion to steel is good and, therefore, a film is produced which is an excellent rust preventive.

5206 The Selection and Use of Phosphate Coatings as Pre-Treatments for Organic Finishes. R. F. Drysdale. *Electroplating and Metal Finishing*, v. 11, Jan. 1958, p. 9-14.

Characteristics; crystal size; free pore area; coating thickness; corrosive residues; resistance to deformation; ideal coating requirements. (To be concluded.)

5207* A Radiometric Study of the Iron Phosphating Process. S. L. Eisler and Jodie Doss. *Industrial Finishing (London)*, v. 9, Dec. 1957, p. 1008 + 2 pages.

The objective was to determine the percentage of iron phosphate in coatings produced by various methods, and to determine if the same reactions occur in acid as in alkaline phosphate solutions.

5208 Application of Paint in Paint Finishing Systems. Allen S. Dawe and John A. Kinn. *Industrial Heating*, v. 24, Dec. 1957, p. 2553 + 6 pages.

Dipping; flow coating; hand gun spraying; electrostatic painting.

5209* (Hungarian.) Chemical Browning (Oxidizing) of Porous Steel Parts Produced by Powder-Metallurgy Process. **Porkohászati úton előállított porózus acélalkatrészek kémiai barnítása (oxidálása).** Pál Csokán. *Kohászati Lapok*, v. 12, no. 7, July 1957, p. 317-318.

Production of uniform, highly corrosion-resistant oxide film on surface of sintered steel pieces by exposure to superheated water vapors. Diagram of equipment and discussion of results.

5210 How Radiation Affects Six Organic Coatings. Lloyd A. Horrocks. *Materials in Design Engineering*, v. 47, Jan. 1958, p. 120-123.

The effects of radiation on phenolic, epoxy, and fluorinated vinyl coatings, nitrocellulose lacquers, and alkyd and silicone-alkyd enamels were evaluated.

5211 Organic Finishing Developments of 1957. Daniel A. Marino. *Metal Finishing*, v. 56, Jan. 1958, p. 50-52.

5212* (German.) Flame-Spraying Metallic Surfaces With a Nonmetallic Protective Layer. **Flammspritzen nichtmetallischer Schutzschichten auf Metalloberflächen.** H. Reininger. *Metalloberfläche*, v. 11, no. 12, Dec. 1957, p. 393-400.

Reviews surface preparation, spray guns, sprayed materials, preparation of spray-powder, properties, and applications.

5213 The Direct Chloride Process for Tinning Cast Iron. C. J. Thwaites and J. J. Day. *Metallurgia*, v. 56, no. 338, Dec. 1957, p. 263-270.

Process gives adequate adhesion to whitemetal bearing alloys, provided that fine grit is used for shot blasting and an ebullient flux layer covers the first tinning bath.

5214 Polyethylene-Wax Coatings. G. S. Peacock, W. H. McKnight, and J. M. Austin. *Modern Packaging*, v. 31, Jan. 1958, p. 137-142.

A study of the functions of low-density polyethylene resins used as wax modifiers to meet specialized requirements in paper coatings.

5215* Electron Microscope Study of Accelerated and Natural Weathering. Sumner B. Twiss, William L. Weeks, and D. Maxwell Teague. *Official Digest. Federation of Paint and Varnish Production Clubs*, v. 30, Jan. 1958, p. 7-36.

Differences in the performance of lacquer and enamel are discussed.

5216* Chemistry and Theory of Polyurethane Coatings. Harry E. Pansing. *Official Digest. Federation of Paint and Varnish Production Clubs*, v. 30, Jan. 1958, p. 37-48.

Typical reactions of the various reactive H groups. Hazards in the use of isocyanates.

5217* The Effect of Extender Particle Size on the Gloss of Outside House Paints. B. G. Brand, R. J. Deibert, and E. R. Mueller. *Official Digest. Federation of Paint and Varnish Production Clubs*, v. 30, Jan. 1958, p. 74-78.

Water-floated micaceous talc was fractionated using a Microplex Classifier, and the effect of the particle size of the various fractions on the gloss and viscosity of outside house paints was investigated. Optimum quality was obtained from micaceous talc when the particle size was between 7 and 30 μ diameter. It was shown that both larger and smaller particles are injurious to the gloss of the dried film. The distribution curve within the above range was found to be important.

5218 Styrenated Alkyds and Epoxy Esters. I. Their Uses and Limitations. M. J. Heavers. *Paint Manufacture*, v. 28, Jan. 1958, p. 5+ 5 pages.

Characteristics, compositions, and current application in industrial coatings and printing inks.

5219 Organic Titanates as Dispersing Agents. H. W. Chatfield. *Paint Manufacture*, v. 28, Jan. 1958, p. 17-21.

Formulations of oil paints, varnish, and inks. Comparison of wetting and dispersing properties of various titanates. Effect of butyl titanates on thixotropy.

5220* Reactive Silicone Resin Intermediates. S. A. Brady, J. C. Johnson, and J. D. Lyons. *Paint and Varnish Production*, v. 48, Jan. 1958, p. 25-31.

A study of the effects of silicone content on some typical coatings. Increased silicone content improved gloss and color retention but decreased craze life.

5221* Improved Tall Oil Fatty Acids. C. S. Nevin and C. R. Young. *Paint and Varnish Production*, v. 48, Jan. 1958, p. 46 + 2 pages.

Details of chemical treatment process which reduces color to a Gardner value of 1-2 and considerably improves drying characteristics.

5222* Effect of Wire Metal on the Thermal Life of Enameled Magnet Wire. J. H. Thomas and J. F. Dexter. *Power Apparatus and Systems*, 1957, no. 33, Dec., p. 1009-1013.

Results of thermal aging tests of a modified silicone enamel coated on several different wire materials.

5223 Which Coating at High Temperature? Gordon D. Oxx, Jr. *Product Engineering*, v. 29, Jan. 1958, p. 61-63.

Demands that the coating controls oxidation of the base metal, prevents erosion, and is compatible with the base metal. Metallic and ceramic systems are considered.

5224* The Influence of Mica on Impact Resistance of Stoving Finishes. H. W. Chatfield. *Product Finishing*, v. 11, Jan. 1958, p. 70-73.

5225 Epoxy Coatings. Performance and Application Data. Fred Grushoff. *Products Finishing*, v. 22, Jan. 1958, p. 42-47.

5226 The Decoration of Tinplate by Roller Coater and Offset Tinprinting Machine. J. M. Boyle and J. Matthews. *Sheet Metal Industries*, v. 35, no. 369, Jan. 1958, p. 35-46.

Techniques, materials and their control, equipment, the automatic tinplate feeder and run-in, the roller coater, the conveyor oven and the automatic oven unloader, and the printing machines are described.

See also: **4871** (analysis of coating materials); **5291** (hot dip tinning); **5574** (bonding of sandwich panels); **5610** (film-forming amines); **5619** (tannate coatings on ferrous metals); **5719** (effect of Hg coating on strength of metal crystals); **6151** (hard surfacing).

CONTROL SYSTEMS, COMPUTERS, AND SYSTEMS ENGINEERING

5227* Magnetic Handling Devices. Lester R. Moskowitz and Arlo F. Israelson. *Automation*, v. 5, Jan. 1958, p. 43-51.

Types of magnets; their advantages and limitations. Suggests the range of practical uses for magnetic forces.

5228 Automation in Practice. S. E. Rusinoff. 261 p. 1957. American Technical Society, Chicago. (TJ213 R85a)

An integrated survey of the latest automation techniques as they are actually applied in the various manufacturing and metal working processes.

5229* (Russian.) On the Synthesis of Structures of Multi-Looped Control Systems Including Elements With Lags. **K sintezu struktur mnogosviaznogo regulirovaniia pri nalichii elementov s zapazdyvaniem.** M. V. Meerov. *Avtomatika i Telemekhanika*, v. 18, no. 12, Dec. 1957, p. 1098-1108.

Main facilities of the systems are ascertained. Some methods are described that permit synthesis of stable systems when the gains of separate circuits are as large as possible. The conditions of non-interaction are obtained.

5230* Latest Developments in Flame Failure Protection. II. *British Chemical Engineering*, v. 3, Jan. 1958, p. 30-37.

Types of thermoelectric devices available, their installation requirements, applications as controllers, and the maintenance points to be observed.

5231* Speed Control in Industry. III. Plant in the Steel, Paper and Machine-Tool Industries. E. J. P. Long. *British Communications & Electronics*, v. 5, Jan. 1958, p. 32-37.

Consideration is given to the controlled plant, showing how controller design functions can accommodate the specialized drive requirements of industrial processes.

5232* A Pictorial Manual on Computers. II. What Does "Magnetic Tape Memory" Look Like? *Computers and Automation*, v. 7, Jan. 1958, p. 12 + 11 pages.

5233 Newest Components for Reliable Switching: Multiple-Ball Relays. John D. Cooney. *Control Engineering*, v. 5, Feb. 1958, p. 82-87.

Electromechanical switch yields high-reliability relays, limit switches, logic elements, and potentiometers.

5234 Positioning Systems. II. John D. Cooney and Byron K. Ledgerwood. *Control Engineering*, v. 5, Feb. 1958, p. 99-122.

Comprehensive descriptions of ten numerically-controlled point-to-point positioning systems.

5235* (Russian.) Self-Aiming as a Problem of Engineering Cybernetics. **Samonavedenie kak zadacha tekhnicheskoi kibernetiki.** A. S. Kel'zon. *Doklady Akademii Nauk SSSR*, v. 116, no. 6, Oct. 21, 1957, p. 933-936.

Choosing the automatic guidance system; analysis and synthesis of self-aiming guided missiles.

5236* Input and Output Facilities of Data-Link Surface Equipment. George W. Reich, Jr. and Harold J. Mills. *Electrical Communication*, v. 34, Sept. 1957, p. 209-218.

Storage system; entering and extracting storage data; distribution.

5237* Motorized Actuators in Hydraulic Systems. Jule Hulman. *Electrical Manufacturing*, v. 61, Jan. 1958, p. 74-77.

5238* The Anatomy of Automation. I. George H. Amber and Paul S. Amber. *Electrical Manufacturing*, v. 61, Jan. 1958, p. 78-83.

So that the problem areas can be defined for the machine and control designer, automation terms are classified and defined in four main categories corresponding to the human machine.

5239* Automatic Testing, Data Recording, and Statistical Analysis System. Eugene Hoo. *Electrical Manufacturing*, v. 61, Jan. 1958, p. 104-108.

Description of the Astramatic system designed for automatic handling, testing, and sorting of components, and automatic accumulation and analysis of statistical data.

5240 Transistorized Memory Monitors Earth Satellite. C. S. Warren, W. G. Rumble, and W. A. Helbig. *Electronics*, v. 31, Jan. 17, 1958, p. 66-70.

Circuits required to numerically translate input information and present modified output information use alloy-junction transistors as current drivers, gated-pulse amplifiers, voltage amplifiers, high-speed switches, and flip-flop.

5241 Electronics in Action. The Current Practicality of Electronic Data Processing. Elizabeth Marting, editor. 158 p. 1957. American Management Assn., New York. (HD28 Am35s Vis.)

Feasibility studies; installation; selection and training of personnel; applications evaluation; new frontiers.

5242 An Error-Sampled Sweep-Position Control System. C. H. Knapp, E. Shapiro, and R. A. Thorpe. *IBM, Journal of Research and Development*, v. 2, Jan. 1958, p. 14-35.

Application of sampled-data theory to the synthesis of a feedback control system using forward-path digital compensation to achieve high accuracy and fast response. Design and operation of a transistor system prototype.

5243 Saturable Reactor Control of Electric Furnaces. II. R. M. Sills. *Industrial Heating*, v. 24, Dec. 1957, p. 2473 + 5 pages.

Characteristics and connections for three-phase load are described and illustrated.

5244 Installing Electronic Data Processing Systems. Richard G. Canning. 193 p. 1957. John Wiley & Sons, New York. (HF5548 C16i)

Covers the significant questions of fitting EDP into the organization, selecting and training personnel, programming, physical installation of the system, and early phases of operation.

5245 An Automatic Power Spectrum Computer. H. W. Smith, R. M. McClure, and F. X. Bostick. *Institute of Radio Engineers, Transactions on Instrumentation*, v. I-6, Dec. 1957, p. 228-231. (TK1 In6.6i Vis.)

An automatic power spectrum computer, using active filter circuits, covers the range from 0.01 to several hundred c.p.s. with almost any desired filter bandwidth.

5246* Predicting Process Control Performance With Computers. W. A. Crawford. *ISA Journal*, v. 5, Jan. 1958, p. 54-57.

5247* Automation of Experimental Tests on a Gas Turbine. W. T. Bane and N. Ream. *Journal of Electronics and Control*, v. 3, no. 6, Dec. 1957, p. 595-630.

A full description of the type of automatic equipment required, the logical design of the control sequences, considerations governing choice of codes throughout the system, and the realization of the control operations by means of relay circuits.

5248* (German.) Development of Electronic Calculating Equipment. **Die Entwicklung elektronischer Rechenanlagen.** N. J. Lehmann. *Nachrichtentechnik*, v. 7, no. 9, Sept. 1957, p. 385-388.

The essential points of calculation technique, and certain mathematical, logical development tendencies of modern calculation machines are stressed.

5249* Station Control Circuitry With Microwave Relaying. B. F. Wirtz. *Power Apparatus and Systems*, 1957, no. 33, Dec., p. 1211-1216.

Design of control circuit for protective relaying. Selection of reliable and high-speed components. Development of automatic reclosing scheme and annunciator system.

5250 Some Graphical Approaches to Coding Problems. Jacques Dutka. *RCA Review*, v. 18, Dec. 1957, p. 466-474.

Graphical methods for constructing codes for use in communicating information in binary coded form are presented and their geometrical interpretations are discussed.

5251 The Use of a High-Speed Digital Computer for the Direct Determination of Crystal Structures. II. W. Cochran and A. S. Douglas. *Royal Society, Proceedings*, v. 243, ser. A, Dec. 24, 1957, p. 281-288.

5252* The Digital Computer Elements and Applications. Roy G. Saltman. *Sperry Engineering Review*, v. 10, Nov.-Dec. 1957, p. 24-30.

The basic elements forming computer building blocks. Some number systems used in computers. Applications in science and business.

5253 Bevatron Induction - Electrode Beam - Monitoring Systems. J. T. Lavrischeff. *University of California, Radiation Laboratory (U. S. Atomic Energy Commission)*, UCRL-8010, Oct. 1957, 17 p. (UF767 U3u Contin.)

System uses the east induction electrode in the Bevatron to provide beam-amplitude signals for specialized monitoring and for primary calibration of other beam-monitoring equipment.

See also: **4655** (inertial guidance); **4664** (aircraft collision warning system); **4846** (chemical control in nuclear fuel processing); **5760** (gaging systems for machine-tool control); **5764** (positioning systems for machine tools); **5767** (Soviet rolling mill automation); **6161** (electronic welding control).

ELECTRICAL ENGINEERING

5254* Maintenance and Repair for Induction Type Motors. J. W. Samzelius and R. F. Woll. *Air Conditioning, Heating, and Ventilating*, v. 55, Jan. 1958, p. 56-66.

5255* Thyrite Bridge Applications. G. D. Barcus, Jr. *Electrical Manufacturing*, v. 61, Jan. 1958, p. 64 + 3 pages.

Design data for non-linear resistance bridge circuits using Thyrite. Applications include phase inversion, frequency multiplication, and voltage regulation.

5256* (Czech.) Application of Over-Voltage Protectors. **Použití přepěť'ových ochran.** Jaroslav Jirků. *Elektrotechnik*, v. 12, no. 12, Dec. 1957, p. 370-373.

The purpose, types, and disposition of protective installations. Description and properties of protective gaps.

5257* (Hungarian.) Calculation of Magnetic Circuits. **Mágneskörök számításáról.** László Gádor. *Elektrotechnika*, v. 50, nos. 8-9, Aug.-Sept. 1957, p. 314-322.

By introduction of complex magnetic resistance a simple method of calculation of a.c. circuits was transferred to magnetic circuits and the method is applied to composed electrical and magnetic circuits.

5258* (Hungarian.) Reduced Parameters of Three Phase Networks. **Háromfázisú vezetékrendszer redukált paraméterei.** György Fodor. *Elektrotechnika*, v. 50, nos. 8-9, Aug.-Sept. 1957, p. 323-329.

Determining three phase network impedance by taking into consideration the mutual inductance between the individual phases by starting from a possible but otherwise arbitrary current distribution. Deviation of the voltage drop.

5259* (German.) Dielectric Losses in Transformer Oils. **Dielektrische Verluste in Transformatorölen.** Karl Potthoff. *ETZ, Elektrotechnische Zeitschrift*, v. 78, Ausgabe A, no. 24, Dec. 1957, p. 881-883.

Results of chemical analysis of commercial insulating oils. Determination of the factors affecting dielectric losses. Effect of temperature and aging.

5260* (German.) Additional Eddy-Current Losses in Cold-Rolled Transformer Sheets. **Zusätzliche Wirbelstromverluste in kaltgewalzten Transformatorenblechen.** Volker Rusbüldt. *ETZ, Elektrotechnische Zeitschrift*, v. 78, Ausgabe A, no. 24, Dec. 1957, p. 891-893.

A small air gap in the magnetic circuit will reduce eddy-current losses.

5261* (German.) Nonabsorbent Porcelain Insulators. **Hydrophobe Porzellanisolatoren.** Alfred Neunteufel. *ETZ, Elektrotechnische Zeitschrift*, v. 9, Ausgabe B, no. 12, Dec. 1957, p. 491-492.

With water-repellent silicone surfaces on porcelain insulators, the wet breakdown voltage can approach the dry breakdown value.

5262* The Dynamic Performance of a Magnavolt Cascade Exciter. R. A. Stevens. *Institution of Electrical Engineers, Proceedings*, v. 104, pt. A, no. 18, Dec. 1957, p. 526-530.

Relating the measured voltage and time-constants of the machine to the frequency and step responses.

5263* Arc Movement Due to the Magnetic Field of Current Flowing in the Electrodes. A. E. Guile and S. F. Mehta. *Institution of Electrical Engineers, Proceedings*, v. 104, pt. A, no. 18, Dec. 1957, p. 533-540.

Tests to investigate the factors which affect the movement of an arc between parallel electrodes, fed with current at one end, in air at atmospheric pressure.

5264 Automation's "Little Giant". Joseph S. O'Flaherty. *Machinery*, v. 64, Jan. 1958, p. 117-120.

Details of current semiconductor component manufacturing techniques.

5265* Tracing and Locating Electrical Faults in Power Circuits. *Mechanical World and Engineering Record*, v. 138, Jan. 1958, p. 18-21.

Use of the schematic wiring diagram for facilitating systematic testing of electrical equipment *in situ*, to effect rapid confirmation and location of suspected faults.

5266 How Feasible Are Electrical Drives for Missile Support Equipment? K. W. Carlson and W. E. Gray. *Missiles and Rockets*, v. 3, Jan. 1958, p. 119 + 2 pages.

Comparison of application requirements with the inherent capabilities of various drives.

5267* 1956 Supplement to the Bibliography and Abstracts on Electrical Contacts. 40 p. 1957. American Society for Testing Materials, Philadelphia. (ZTK2841 Am35b Ref.)

Contains 165 references to the 1955 and 1956 literature.

5268 Symposium on Insulating Oils. 39 p. 1957. American Society for Testing Materials, Philadelphia. (TJ1077 Am35sym)

Evaluation of laboratory tests as indicators of the service life of uninhibited electrical insulating oils. Use of solid and liquid catalysts for the accelerated aging testing of transformer oil.

5269* (Norwegian.) Dry Batteries. Some Practical Points of View. **Torrbatterier. Noen praktiske synspunkter.** K. Endresen. *Teknisk Ukeblad*, v. 105, no. 1, Jan. 2, 1958, p. 5-10.

Historical survey. Leclanche cells. Modern types. Discharge characteristics. Effect of temperature. Storage capacities.

5270 Environmental Testing of Solderless Connectors. J. A. Barber. *U. S. Atomic Energy Commission, Technical Memorandum*, SCDC-666 (137-57-16), June 1957, 57 p. (UF 767 Un3.1scd Contin.)

Effect of vibration, mechanical and thermal shock, humidity, and salt spray on the mechanical and electrical characteristics of various types of solderless connectors was determined.

See also: **5222** (enameled magnet wire); **5581** (Al alloy electrodes); **5729** (selection of materials for high-voltage machines); **6029** (irradiated polyethylene insulation systems).

ELECTROCHEMISTRY

5271 (English.) **Anomalies in the Growth of Anodic Oxide Films on Rough Surfaces.** L. Young. *Acta Metallurgica*, v. 5, no. 12, Dec. 1957, p. 711-716.

5272* (German.) Recovery of Zinc From Scrap by Alkaline Electrolysis. **Rückgewinnung von Zink aus Abfällen durch alkalische Elektrolyse.** Bogumila Winsch and Władysław Rutkowski. *Chemische Technik*, v. 9, no. 11, Nov. 1957, p. 654-657.

5273 Desalting of Water by Electrodialysis. C. H. de Whalley. *Chemistry & Industry*, no. 1, Jan. 4, 1958, p. 8-13.

5274* Electroplating of Screws and Other Small Parts. II. Werner Peters. *Draht (English Ed.)*, 1957, no. 32, Dec., p. 31 + 8 pages.

Design and operation of plating equipment. Electrolytes used in Ni, brass, Zn, Cd, and Cr plating. Finishing treatment. (To be continued.)

5275* (English.) **Copper Plating From the Pyrophosphate Bath. I.** S. K. Panikkar, R. P. Singh, and T. L. Rama Char. *Electrochemical Society, Bulletin of India Section*, v. 6, no. 4, Oct. 1957, p. 69-73.

Optimum conditions are established for electrodeposition of Cu on steel. Performance is satisfactory over a wide range of conditions.

5276 Formation of Manganese(II) Ion in the Discharge of the Manganese Dioxide Electrode. II. Effect of Volume and pH of Electrolyte. W. C. Vosburgh, Mary Jo Pribble, Akiya Kozawa, and Ahmad Sam. *Electrochemical Society, Journal*, v. 105, Jan. 1958, p. 1-4.

Discharge of the MnO_2 electrode at *p*H 5 to 8 gives Mn^{++} in solution as well as a lower oxide. When the volume of electrolyte is varied the amount of Mn^{++} formed in constant time and at constant current density is practically independent of volume. It decreases as the *p*H increases, becoming small at *p*H 8.

5277 Analysis of Films on Copper by Coulometric Reduction. R. H. Lambert and D. J. Trevoy. *Electrochemical Society, Journal*, v. 105, Jan. 1958, p. 18-23.

A technique is described for reduction of films on Cu and other electropositive metals which utilizes a granular electrode for rapid and thorough pre-electrolysis of electrolyte to remove dissolved O and traces of plateable cations.

5278 Acid Copper Plating on Aluminum. J. T. N. Atkinson. *Electrochemical Society, Journal*, v. 105, Jan. 1958, p. 24-27.

A method for plating Cu on Al and its alloys that eliminates the need for special pretreatments, such as zincate dips.

5279 The Anodic Oxidation of Zinc and Zinc-Tin Alloys at Very Low Current Density. S. E. S. El Wakkad, A. M. Shams El Din, and H. Kotb. *Electrochemical Society, Journal*, v. 105, Jan. 1958, p. 47-51.

Anodic oxidation was carried out in solutions of different *p*H values using the direct potentiometric method. In the case of Zn, the primary oxidation product was a film of ZnO or hydroxide less than one molecule thick. When Sn was alloyed with Zn, the anodic process resulted in the successive formation of zinc hydroxide, stannous, and stannic hydroxides before O evolution.

5280* Electroplated Coatings and Allied Processes. William H. Safranek, Leslie D. McGraw, Luther E. Vaaler, John G. Beach, and Paul T. Woodberry. Paper from "Engineering Materials Handbook". Sec. 20, 45 p. 1958. McGraw-Hill, New York. (TA403 M31e Ref.)

This thorough compilation of engineering data deals with applications, specifications, tests, properties of electroplates, preparation for plating, equipment and control, economics of electroplates, and other related coating, cleaning, and polishing methods.

5281 Electrochemistry of Sulphur. I. Overpotential in the Discharge of the Sulphide Ion. P. L. Allen and A. Hickling. *Faraday Society, Transactions*, v. 53, Dec. 1957, p. 1626-1635.

5282* (Czech.) Electrolysis of Aluminum. **Elektrolysa hliníku.** Oskar Pich. *Hutnické Listy*, v. 12, no. 11, Nov. 1957, p. 1056-1060.

Development of technology for electrolysis of Al. Factors affecting the electric and energetic efficiency. Measures necessary to improve the efficiency of electrolysis in CSR.

5283 (French.) Active and Passive State of Bismuth. **État actif et passif du bismuth.** V. Čupr. *Journal de Chimie Physique*, v. 54, no. 10, Oct. 1957, p. 804-814.

An electrolytic method with a rectangular intermittent current and recording of the electrode potential with and without a current. Active and passive state of Bi and behavior of Bi electrodes cathodically or anodically polarized.

5284 The Effect of the Solvent on the Standard Electrode Potential of the Silver-Silver Chloride Electrode. I. T. Oiwa. *Journal of Physical Chemistry*, v. 61, Dec. 1957, p. 1587-1590.

The solvent effect on the standard potential of the cell H_2 (Pt-Pt) (1 atm.)/HCl (soln.)/AgCl-Ag, can be estimated by a new equation which is based upon the free energy change of solution of HCl with the change of the solvent.

5285* (Russian.) The General Principles of the Formation of Metallic Alloy Organosols at the Cathode Under Conditions of a Double Layer Bath. **Obshchie printsipy obrazovaniia organozolei splavov metallov na katode v usloviiakh dvukhsloinoi vanny.** E. M. Natanson and N. N. Kozachek. *Kolloidnyi Zhurnal*, v. 19, no. 6, Nov.-Dec. 1957, p. 698-705.

The optimal composition of such baths was established and the conditions for the formation of organosols of Pb-Sn, Ni-Cr, and Ni-Fe alloys investigated.

5286 Electrophoretic Deposition of Plutonium. A Feasibility Study. K. A. Walsh. *Los Alamos Scientific Laboratory (U. S. Atomic Energy Commission)*, LA-2153, Jan. 1958, 13 p. (UF767 U3La Contin.)

Deposition from suspensions in *n*-butyl alcohol and other organic liquids was examined for its feasibility in the preparation of thin sections of Pu metal. Success depends on the choice and availability of an inert solvent vehicle.

5287 Firm Adherent Plating for Aluminum. J. C. Withers and P. E. Ritt. *Metal Finishing*, v. 56, Jan. 1958, p. 53 + 2 pages.

A new method consists of producing a thin coating of Ni on the surface of the Al, then heat treating the Ni-clad Al, which forms a suitable base for subsequent metals to be plated with perfect adhesion.

5288* Some Aspects of Zinc, Copper, Nickel and Chromium Plating. L. Ades. *Metal Finishing Journal*, v. 3, Dec. 1957, p. 477 + 8 pages.

Use of Zeromist to reduce throwing power. Use of sulfamic acid. Anodic-chromic anodizing of light alloys. Zinc plating of cast iron. Alkaline Cu plating baths. Impurities in the Udylite bright Ni bath.

5289* Throwing Power in EFCO-Udylite Bright Nickel Solutions. P. Meuldijk. *Metal Finishing Journal*, v. 3, Dec. 1957, p. 491 + 2 pages.

Influence of solution composition, total current, and various contaminants.

5290* Some Comments on the Anodic Oxidation of Aluminium Alloys Containing Copper. J. Hérenguel and P. Le-Long. *Metal Finishing Journal*, v. 4, Jan. 1958, p. 20-23.

Difficulties caused by Cu in solid solution. Yellow coloration of the oxide film on homogeneous Al-Cu solid solutions of high purity.

5291 Some Advances in Tinplate Technology. W. E. Hoare. *Metal Progress*, v. 73, Jan. 1958, p. 91-96.

Discusses tighter thickness tolerances, annealing for both stiffness and ductility, improved tinning machinery (both electrolytic and roller coatins), and electronic control of high-speed lines.

5292 New Approach to Electrolytic U. L. W. Niedrach, B. E. Dearing, and A. C. Schafer. *Nucleonics*, v. 16, Jan. 1958, p. 64-65.

The development of a process analogous to the Hall process used for Al production has resulted in the design of a production-scale cell.

5293 (English.) **Luminescence of the Oxide Layer on Aluminium During and After Its Formation by Electrolytic Oxidation.** W. Ch. van Geel, C. A. Pistorius, and B. C. Bouma. *Philips Research Reports*, v. 12, Dec. 1957, p. 465-490.

Describes measurements of the luminescence occurring with an anodically deposited oxide layer on Al.

5294* **Nickel Sulphamate Plating.** E. Calderon. *Product Finishing*, v. 10, Dec. 1957, p. 81 + 3 pages.

Claims for the nickel sulphamate bath in producing stress-free deposits of high tensile strength. Domestic experience with this bath is described.

5295* **Bright Nickel Plating. I. Basic Solutions.** D. J. Fishlock. *Product Finishing*, v. 11, Jan. 1958, p. 48-62.

Applications of Ni electrodeposition. The chief types of modern baths. Other plating methods.

5296* (Norwegian.) Nickel Saving in Electro-Deposition. **Besparelse av nikkel ved elektroplettering.** *Teknisk Ukeblad*, v. 104, Dec. 12, 1957, p. 1049-1051.

A study of the external factors influencing metal distribution over a cathode: cathode shape and distance from the anode. Simple electrical and mechanical means to prevent excessive deposition.

See also: **4849** (adsorption isotherms with powder electrodes); **4907** (electrical methods of analysis); **5202** (graining of electrodeposits); **5223** (temperature resistant plating); **5469** (membrane electrodes); **5622** (anodic oxidation of Ti); **5633** (electrowinning of Co and Ni); **5734** (thick anodic coatings on Al alloys); **6085** (cyanide waste treatment).

ELECTRONICS

5297 Laboratory Standard Ceramic Microphone. William Newitt. *Acoustical Society of America, Journal*, v. 29, Dec. 1957, p. 1356-1365.

Microphones using barium titanate disk ceramics in conjunction with a split-tube diaphragm were designed. Frequency response measurements were obtained by use of reciprocity techniques and by comparison with a known standard.

5298* (French.) New Perspectives on the Propagation of Radioelectric Waves. **Perspectives nouvelles sur la propagation des ondes radioélectriques.** Jean Voge. *Âge Nucléaire*, 1957, no. 7, Nov.-Dec., p. 38-47.

A study of decametric waves, very short waves, very long waves, and atmosphere, aimed at a better use of the radioelectric spectrum and equipment and a better knowledge of the atmosphere as a transmission medium.

5299* (German.) A Numerical Method for the Determination of a Two-Pole Function That Approximates a Given Complex Function in an Interval of Real Frequencies. **Ein numerisches Verfahren zur Ermittlung einer Zweipolfunktion, welche in einem Intervall reeller Frequenzen eine gegebene komplexe Funktion approximiert.** Rolf Unbehauen. *Archiv der Elektrischen Übertragung*, v. 11, no. 11, Nov. 1957, p. 440-448.

After transformation of the variables the approximation problem is solved with the aid of polynomials as a first step. Subsequently general rational functions are determined that approximate the polynomials found in the transformed frequency range.

5300 Loudness, Its Definition, Measurement and Calculation. III. Harvey Fletcher and W. A. Munson. *Audio*, v. 42, Jan. 1958, p. 32 + 7 pages.

(To be concluded.)

5301* (Russian.) The Synthesis of Pulse Circuits and Systems With a Pulse Feedback. **Sintez impul'snykh tsepei i sistem s impul'snoi obratnoi sviaz'iu.** V. P. Perov. *Avtomatika i Telemekhanika*, v. 18, no. 12, Dec. 1957, p. 1081-1097.

The determination of optimum characteristics is considered. As a criterion of the optimum the condition of the minimum root mean square is taken when dynamic accuracy and transient time are known.

5302 Magnetic Amplifiers: Basic Principles and Applications. L. W. Stammerjohn. *Bell Laboratories Record*, v. 36, Jan. 1958, p. 16-20.

5303 Wafer-Type Rectifiers for Millimeter Waves. W. M. Sharpless. *Bell Laboratories Record*, v. 36, Jan. 1958, p. 21-24.

Describes the point-contact Si rectifier designed for very H.F. signals.

5304* **High-Voltage Applications of Casting Resins.** K. A. Fletcher. *British Communications & Electronics*, v. 5, Jan. 1958, p. 10-15.

Voltage breakdown in air; voltage breakdown in solid insulators; component design.

5305* **"S.A.R.A.H.": A U.H.F. (243 Mc/s) Pulse Coded Air/Sea Rescue System.** D. Kerr. *British Institution of Radio Engineers, Journal*, v. 17, Dec. 1957, p. 669-680.

The simplification in construction and operation of the personal radio beacon which a pulsed system gives justifies the need for a special receiver in the search aircraft or vessel. A double pulse is used.

5306 The Breakdown of Liquid Dielectrics and Its Dependence on Oxidation of the Electrodes. R. Hancox. *British Journal of Applied Physics*, v. 8, Dec. 1957, p. 476-480.

An electric field may exist in the oxide layer owing to the chemisorption of O, which would be expected to reduce the probability of electron emission from the cathode and thus increase the recorded breakdown strength. Results on the breakdown of pretreated transformer oil using stainless steel, brass, and Al electrodes support this conclusion.

5307 Spectral Response and Linearity of Photomultipliers. H. Edels and W. A. Gambling. *British Journal of Applied Physics*, v. 8, Dec. 1957, p. 481-482.

Spatial variations of the spectral response to type RCA931A photomultiplied tubes show that the response varies widely with wavelength.

5308 On the Theory of Propagation of Electromagnetic Waves Along a Curved Surface. James R. Wait. *Canadian Journal of Physics*, v. 36, Jan. 1958, p. 9-17.

The problem of propagation of vertically polarized waves along a surface whose curvature and electrical properties have a discontinuity is considered.

5309* **Thermal Relays Perform Unique Functions.** J. David Marks. *Electrical Manufacturing*, v. 61, Jan. 1958, p. 109 + 6 pages.

Logical design sequence followed step-by-step research in materials and operating mechanics, culminating in a new relay type having its own definite areas of circuit functions.

5310 Continuous Recording of Waveforms on Photographic Film. V. B. Hulme. *Electronic Engineering*, v. 30, Jan. 1958, p. 10-14.

Limits to the information capacity of photographic film as a medium for recording electrical waveforms. Some suggestions for improvement, employing a ribbon-beam cathode-ray tube.

5311 A Versatile Pulse Pattern Generator. Peter H. Cutler and L. R. Peters. *Electronic Engineering*, v. 30, Jan. 1958, p. 39-42.

Two independent pulse pattern generators are used to produce any sequence of pulses of either polarity; either sequence contains up to ten pulses, and the pulse duration may be varied from 45μ sec to 1 sec.

5312 Three Output Immittance Theorems. Harry Stockman. *Electronic Industries*, v. 17, Jan. 1958, p. 61 + 6 pages.

Formulates theorems designed to assist one in treating linear networks in transistor circuitry. Their validity is not disturbed by variations in the power supply.

5313 A Prospectus on Medical Electronics. Richard G. Stranix. *Electronic Industries*, v. 17, Jan. 1958, p. 64-67.

A quick survey of recent developments; a calculated guess of what's anticipated. (To be continued.)

5314 Understanding the Backward Wave Oscillator. Donald A. Dunn. *Electronic Industries*, v. 17, Jan. 1958, p. 72-76.

A series of logical steps, each representing an easily visualized physical occurrence, leads to an understanding of backward-wave oscillation.

5315 Raising the Limits for Coaxial Cables. E. T. Pfund, Jr., W. F. Croft, and Bard Suverkrop. *Electronic Industries*, v. 17, Jan. 1958, p. 81-85.

Progress report reviews present knowledge and practical experience with coaxial cables at very high temperatures.

5316* Rhombic Aerials. F. J. Norman and J. F. Ward. *Electronic & Radio Engineer*, v. 34, Nov. 1957, p. 398-403.

Design charts for high frequencies.

5317* Polyphase Oscillators. A. S. Gladwin. *Electronic & Radio Engineer*, v. 35, Jan. 1958, p. 16-24.

A comparison of the various types of symmetrical polyphase and single-phase oscillators with respect to such factors as frequency stability and harmonic generation.

5318 Pill Telemeters From Digestive Tract. Stuart MacKay and Bertil Jacobson. *Electronics*, v. 31, Jan. 3, 1958, p. 51-53.

Radio sounding device, small enough to swallow and pass through the gastro-intestinal tract, generates 400-kc. signals that transmit internal temperature and pressure information.

5319 Modern Sonar Systems Guide Atom Subs. James A. Rummell. *Electronics*, v. 31, Jan. 3, 1958, p. 56-62.

New transducers and new electronic scanning and search-lighting techniques give increased detection ranges for both active and passive sonar, and additional data on bearing, course, range-changing rate, and type of vessel.

5320 Transistor Reflex Circuit Trims Receiver Costs. Erich Gottlieb. *Electronics*, v. 31, Jan. 3, 1958, p. 66-68.

Four transistors in portable radio do the work of five as second I.F. stage doubles as audio amplifier.

5321 Band-Pass Filter Design Technique. D. R. J. White. *Electronics*, v. 31, Jan. 3, 1958, p. 79-81.

Universal curves provide design information for Butterworth and Tchebycheff stagger-tuned filter networks for band-pass amplifiers.

5322 B-H Tester Measures Memory Core Parameters. T. H. Bonn, R. D. Torrey, and F. Bernstein. *Electronics*, v. 31, Jan. 17, 1958, p. 76-80.

Measures hysteresis properties of small magnetic toroids used in coincident-current memories and high-speed magnetic amplifiers.

5323 Cathode-Ray Recorder Compares Transients. C. W. Hargens. *Electronics*, v. 31, Jan. 17, 1958, p. 84-87.

Closely-grouped cathode-ray tubes for each of 12 channels are photographed on 4 by 5-in. film. Projector enlarges film negative images to twice crt display size and presents four crt images simultaneously.

5324 Tropo-Scatter System Design Charts. L. P. Yeh. *Electronics*, v. 31, Jan. 17, 1958, p. 91-93.

Charts facilitate estimation of system parameters for any frequency-division multiplex tropospheric scatter system, either f-m or ssb a-m.

5325* (Russian.) Germanium Rectifiers at High Frequencies. **Germanievye vypriamiteli na povyshennykh chastotakh.** B. D. Kurnosov. *Elektrichestvo*, 1957, no. 12, Dec., p. 54-56.

Describes new Ge rectifiers capable of operating at 5000 cps.

5326* (Hungarian.) Magnetic Amplifiers of Classical Design. **Klasszikus kapesolású mágneses erősítők.** Frigyes Csáki and Andor Frigyes. *Elektrotechnika*, v. 50, nos. 8-9, Aug.-Sept. 1957, p. 294-308.

Existence of a sharp knee at the saturation point of the magnetizing line of materials used for the operation of magnetic amplifiers. Determination of amplifying conditions and dynamic properties. External feedback and different connections.

5327* The Multirecorder—An Instrument for Recording Switching Time Functions. Erik Nylund. *Ericsson Review*, v. 34, no. 3, 1957, p. 90-94.

Operation and performance data.

5328* (German.) Method for the Deduction of the Heterodyne Frequency of a Receiver From the Measuring Frequency of a Transmitter. **Verfahren zur Ableitung der Überlagerungsfrequenz eines Empfängers aus der Messfrequenz eines Senders.** R. Kersten. *Frequenz*, v. 11, no. 12, Dec. 1957, p. 370-379.

5329 Effects of Low Temperatures on Transistor Characteristics. A. B. Credle. *IBM, Journal of Research and Development*, v. 2, Jan. 1958, p. 54-71.

The four-pole parameters of a group of similar *pnp* transistors were measured in the frequency range from 0.5 to 5 mc. and from room temperature down to that of liquid N. The measured parameters are translated into simple frequency and temperature ranges.

5330 A Broad-Band Microwave Source Comparison Radiometer for Advanced Research in Radio Astronomy. F. D. Drake and H. I. Ewen. *I.R.E., Proceedings*, v. 46, Jan. 1958, p. 53-60.

Details of a traveling-wave tube radiometer operating at 800 mc. with a bandwidth of 1000 mc. and sensitivities of the order of 0.01 K.

5331 A Transistor Regulated Power Supply for Video Circuits. Robert H. Packard and Marvin G. Schorr. *Institute of Radio Engineers, Transactions on Broadcast Transmission Systems*, v. PGBTS-9, Dec. 1957, p. 32-38. (TK1 In6.6bt Vis.)

A high-efficiency power supply for 280 volts and 1.5 amperes is compared with conventional supplies using vacuum tubes.

5332 An Automatic Phase-Measuring Circuit at Microwaves. R. Mittra. *Institute of Radio Engineers, Transactions on Instrumentation*, v. I-6, Dec. 1957, p. 238-240. (TK1 In6.6i Vis.)

Apparatus is suitable for the measurement of diffraction pattern by objects, the plotting of phase pattern in the mouth of an antenna feed, and for various other applications.

5333 Frequency Stabilization of Variable Oscillators. D. Makow. *Institute of Radio Engineers, Transactions on Instrumentation*, v. I-6, Dec. 1957, p. 241-245. (TK1 In6.6i Vis.)

A circuit where a single quartz crystal exercises considerable control over a range of continuously variable frequencies.

5334 Ultrasonic Output Power Measurements in Liquids. George E. Henry. *Institute of Radio Engineers, Transactions on Ultrasonics Engineering*, no. PGUE-6, Dec. 1957, p. 17-31. (TK1 In6.6u Vis.)

"Gross Acoustic Power Transfer" is related to, but should not be confused with, power density, intensity, energy density, and gross acoustic output from the transducer.

5335 A Theory of Pulse Transmission Along a Magnetostrictive Delay Line. A. Rothbart and L. Rosenberg. *Institute of Radio Engineers, Transactions on Ultrasonics Engineering*, no. PGUE-6, Dec. 1957, p. 32-58. (TK1 In6.6u Vis.)

The theory was used to derive a mathematical relationship between the output voltage pulse from the receiver coil and the input current pulse to the transmitter coil.

5336 Lifetime in Pulled Silicon Crystals. C. A. Bittmann and G. Bemski. *Journal of Applied Physics*, v. 28, Dec. 1957, p. 1423-1426.

Lifetime data of 46 pulled Si crystals are interpreted in terms of the Shockley-Read recombination theory. The data are consistent with the theory under the assumption of a single recombination level and a constant concentration of recombination centers, independent of the resistivity of the crystals.

5337 Effect of Heat Treatment Upon the Electrical Properties of Silicon Crystals. C. S. Fuller and R. A. Logan. *Journal of Applied Physics*, v. 28, Dec. 1957, p. 1427-1436.

Studies were made of the process in which donors are introduced into Si by heating in the temperature range 300 –500 C and are caused to disappear on heating at higher temperature. This phenomena is shown to depend on the conditions of growth and the heat-treatment history of the crystal.

5338 Junction of Smooth Flared Wave Guides. D. J. Leonard and J. L. Yen. *Journal of Applied Physics*, v. 28, Dec. 1957, p. 1441-1448.

Stevenson's general theory of electromagnetic horns or flared wave guides is generalized to include sudden jumps in the first derivatives of the cross sections. Thus the junction of wave guides with different flares and of arbitrary cross sections can be treated.

5339 Some New Aspects of the Reflection of Electromagnetic Waves on a Rough Surface. M. A. Biot. *Journal of Applied Physics*, v. 28, Dec. 1957, p. 1455-1463.

The reflection of a plane-electromagnetic wave from a rough perfect conductor is investigated. The roughness is represented by hemispherical bosses whose radii and mutual distances are small relative to the wavelength. This problem is solved taking into account the electromagnetic interaction of the bosses.

5340 On the Mechanism of Operation of the Barium Aluminate Impregnated Cathode. E. S. Rittner, W. C. Rutledge, and R. H. Ahlert. *Journal of Applied Physics*, v. 28, Dec. 1957, p. 1468-1473.

Emission and evaporation characteristics of a porous tungsten cathode impregnated with the composition $5BaO \cdot 2Al_2O_3$ are presented and interpreted in terms of the cathode mechanism.

5341* Plug-In Reflex Klystrons for Microwaves. A. F. Pearce, K. H. Kreuchen, C. Baron, N. Houlding, and S. Ratcliffe. *Journal of Electronics and Control*, v. 3, no. 6, Dec. 1957, p. 535-563.

Advantages include flexibility of cavity design, low replacement cost, improved consistency of characteristics, and a reduction in the number of types of valve needed to cover a wide frequency band.

5342 Solid State Image Amplifiers. G. F. J. Garlick. *Journal of Scientific Instruments*, v. 34, Dec. 1957, p. 473-479.

Recent developments in solid state image devices using photoconductors and electroluminescent phosphors. The simplest device uses a thin homogeneous phosphor layer between transparent electrodes.

5343 Design and Operating Characteristics of Electromechanical Transducers. Abraham I. Dranetz. *Machine Design*, v. 30, Jan. 9, 1958, p. 120-128.

5344* (Hungarian.) Temperature Dependence of Sb-Cs Photocathodes in the Temperature Range of –170 C to +20 C. **Sb-Cs Fotokatódok erzekenysengenek hőmersekletfuggese a —170 C° —tól +20 C°-ig terjedő hőmérsékleti tartományban.** Zsolt Náray. *Magyar Fizikai Folyóirat*, v. 5, no. 5, 1957, p. 427-430.

5345* (German.) Special Problems of the Barrier Layer Semiconductors. **Besondere Probleme der Sperrschichthalbleiter.** M. Falter. *Nachrichtentechnik*, v. 7, no. 9, Sept. 1957, p. 405-411.

Study of the mechanism of the *p-n*-rectifier and *p-n-p*-transistor, also the relationship between saturation current and motion.

5346* (German.) Diode- and Klystron-Measuring Equipment for the 3.2 cm. Region. **Dioden- und Klystron-Messgerät für das 3,2-cm-Gebiet. II.** W. Otto. *Nachrichtentechnik*, v. 7, no. 11, Nov. 1957, p. 502-506.

Construction of the measuring equipment for Si diodes; comparison with other instruments.

5347 Naval Research Laboratory Research Reactor. III. An Eight-Decade Logarithmic Amplifier for Nuclear Reactor Instrumentation. G. F. Wall and M. P. Young. *Naval Research Laboratory, Report* 5025, Oct. 1957, 12 p. (T21 Un3.5n Contin.)

The logarithmic amplifier developed at NRL has a dynamic range of eight decades of current (10^{-11} to 10^{-3} ampere), good accuracy, a high degree of stability with changes in heater voltages, and requires no range switching.

5348* New Automatic Read-Out System Developed for Multi-Channel Pulse Analysers. C. N. Davey and R. L. Elliott. *Nuclear Power*, v. 3, Jan. 1958, p. 19-23.

Punch-card, octal system speeds work and eases data handling.

5349 A Square-Wave Cyclotron Oscillator. C. D. Goodman. *Oak Ridge National Laboratory (U. S. Atomic Energy Commission)*, ORNL-2403, Jan. 1958, 52 p. (UF767 U3o Contin.)

Shows that replacing the usual sine wave accelerating voltage in conventional cyclotrons with a square wave would result in less beam loss due to electric defocusing. Application in AVF cyclotrons.

5350 The Junction Transistor as a Network Element at Low Frequencies. I. Characteristics and *h* Parameters. J. P. Beijersbergen, M. Beun, and J. te Winkel. *Philips Technical Review*, v. 19, no. 1, 1957-1958, p. 15-27.

A transistor, like other network elements with three terminals, can be turned into a fourpole in three different ways, these being known as the common-emitter, common-base, and common-collector configurations. Parallels with tube circuits are discussed.

5351 A 4000 Mc/s Wide-Band Amplifier Using a Disc-Seal Triode. J. P. M. Gieles. *Philips Technical Review*, v. 19, no. 5, 1957-1958, p. 145-156.

Construction and properties of an amplifier for operation at frequencies from 3800 to 4200 Mc/s. The tube used in the amplifier may be an EC 56 or an EC 57, with which an output power of 0.5 and 1.5 W respectively can be obtained with a gain of 8 dB. The low level is 12 and 13 dB respectively.

5352 Low-Voltage Oscilloscope Tubes. F. de Boer and W. F. Nienhuis. *Philips Technical Review*, v. 19, no. 5, 1957-1958, p. 159-164.

An account of the development of oscilloscope tubes requiring an anode voltage of only 400 V. There are two types, DG 7-32 and DG 7-31. The sweep voltage is fed to the first type symmetrically; one X-plate is earthed in the second type, the sweep voltage therefore being fed asymmetrically.

5353 Dispenser Cathodes. I. Introduction. A. Venema. **II. The Pressed Cathode.** R. C. Hughes and P. P. Coppola. **III. The Impregnated Cathode.** R. Levi. *Philips Technical Review*, v. 19, no. 6, 1957-1958, p. 177-208.

The pressed cathode is made by the press-molding of a W-Mo alloy powder and a powder of Ba-Ca aluminate. The impregnated cathode is made by impregnating a porous W body with molten Ba aluminate or Ba-Ca aluminate.

5354 Filters, Built From Coaxial Conductors. Th. J. Weijers. *Philips Telecommunication Review*, v. 18, no. 4, Nov. 1957, p. 186-206.

Deals systematically with the more usual methods of building filters from coaxial conductors in such a way that the properties of the filter can be deduced for the entire frequency range. (To be concluded.)

5355* (English.) **Recombination of Excess Carriers in Semiconductors.** Jun'ichi Okada. *Physical Society of Japan, Journal*, v. 12, no. 12, Dec. 1957, p. 1338-1344.

The recombination of excess carriers in semiconductors is discussed on the basis of a model in which the recombination occurs through multiple-levels. The dependence of carrier lifetime on temperature in most pure *n*-type Ge samples can be explained by introducing two sets of traps, recombination and hole trapping centers.

5356* Platinum-Cored Thermionic Valves in the Transatlantic Telephone Cable. G. H. Metson. *Platinum Metals Review*, v. 2, Jan. 1958, p. 2-6.

Compares the American 175 HQ and the British 6P12 tubes. Service life of the 6P12 is examined.

5357* (Russian.) Physical Properties and Calculation Technique of the L-Cathode. **Fizicheskie svoistva i elementy rascheta poristogo barii-vol'framovogo katoda.** N. D. Morgulis. *Radiotekhnika i Elektronika*, v. 2, no. 12, Dec. 1957, p. 1471-1478.

Uniformity of emissions from the surface of an L-cathode; dynamic equilibrium of its active surface film subjected to heating. Effect of chemically active gases and Ba vapor diffusion on the external emitting surface.

5358 (Russian.) Chemical Effect of Oxygen on Electron Emission of an L-Cathode. **Khimicheskoe vozdeistvie kisloroda na elektronnuiu emissiiu poristogo metalloplenochnogo katoda.** Ia. P. Zingerman and V. Ia. Soltyk. *Radiotekhnika i Elektronika*, v. 2, no. 12, Dec. 1957, p. 1512-1518.

The effect of O, N, and H on emission.

5359 New Approaches to the Amplification of Microwaves. James P. Wittke. *RCA Review*, v. 18, Dec. 1957, p. 441-457.

Two types of "molecular" microwave amplifiers, the maser and parametric are described. The maser amplifies by converting internal energy of molecules to radiation energy. Parametric amplification is based on the "negative resistance" introduced into a circuit by a nonlinear reactance when driven by a strong H.F. signal.

5360 Electron Mobility in the Germanium-Silicon Alloys. B. Goldstein. *RCA Review*, v. 18, Dec. 1957, p. 458-465.

Describes a method for measuring the conductivity mobility of a semiconductor, and an application of this method to the measurement of the majority carrier mobility in the Ge-Si alloy system.

5361 A Carrier-Energized Bistable Circuit Using Variable-Capacitance Diodes. E. O. Keizer. *RCA Review*, v. 18, Dec. 1957, p. 475-485.

Outlines the principles of operation of the basic bistable circuit and describes variations, including a transistor version where the two junctions of a transistor are used in place of two variable-capacitance diodes.

5362 Influence of Hydration-Dehydration of the Germanium Oxide Layer on the Characteristics of P-N-P Transistors. J. Torkel Wallmark and R. R. Johnson. *RCA Review*, v. 18, Dec. 1957, p. 512-524.

When Ge p-n-p transistors are subjected to a change in temperature, the current-transfer ratio shows a corresponding change, approaching an asymptotic value in approximately 48 hrs. Simultaneously the saturation current of the emitter and collector junctions shows a similar change.

5363 Simplified Treatment of Electric Charge Relations at a Semiconductor Surface. E. O. Johnson. *RCA Review*, v. 18, Dec. 1957, p. 525-555.

Graphical representation is used to describe the electric charge and potential relations. The balance between trapped and mobile charge at the surface is considered for both equilibrium and non-equilibrium situations.

5364 Comparison of the Semiconductor Surface and Junction Photovoltages. E. O. Johnson. *RCA Review*, v. 18, Dec. 1957, p. 556-577.

The functional dependence of the two photovoltages on the light-injected carrier densities is exactly the same, except in the region of saturation. The surface and the junction are basically different with respect to the effect or electric charge changes in traps.

5365 Use of Oxide Cathodes in Demountable Vacuum Systems. George A. Haas and John T. Jensen, Jr. *Review of Scientific Instruments*, v. 28, Dec. 1957, p. 1007-1010.

Life of an oxide cathode can be substantially increased when subjected to repeated air exposures. This is accomplished by preventing the hydrate formation, and consequently reducing flaking of the cathode coating.

5366* (Italian.) Experimental Determination of the Average Lifetime of Minority Charges in Semiconductors. **Determinazione sperimentale della vita media delle cariche minoritarie nei semiconduttori.** Venanzio Andresciani and Giancarlo Della Pergola. *Ricerca Scientifica*, v. 27, no. 9, Sept. 1957, p. 2663-2673.

Describes method, applicable in industry, for the measurement of lifetime. A Wheatstone bridge served as a d.c. circuit.

5367 The Excitation Theory of Arcs With Evaporating Cathodes. A. von Engel and A. E. Robson. *Royal Society, Proceedings*, v. 243, ser. A, Dec. 24, 1957, p. 217-236.

A new theory is suggested: electrons are released from the cathode by the impact of excited atoms. The electrons gain energy in the cathode fall and produce excited atoms in the dense vapor.

5368 Semiconductor Surface Physics. R. H. Kingston, editor. 413 p. 1957. University of Pennsylvania Press, Philadelphia. (QC611 C76s)

A collection of 23 papers dealing with clean Ge surfaces, real surfaces, oxidation, and adsorption and catalysis.

5369 Techniques of Magnetic Recording. Joel Tall. 472 p. 1958. Macmillan Co., New York. (TK5981 T14t)

A condensed history of developments since 1900, with details of numerous specific applications.

5370 Selection of Optimum Antenna Arrays. Charles J. Drane, Jr. and George B. Parrent, Jr. *U. S. Air Force, Cambridge Research Center*, AFCRC-TR-57-109, May 1957, 32 p. (TK7800 Un3.12b Contin.)

So far as image-forming properties of the system are concerned, there are two useful quality criteria for selecting the optimum antenna array, namely directivity and fidelity defect.

5371* (English and French.) **Microwave Triode B-26 for 4.000 Mc/s Operation.** Y. Nakamura, T. Miwa, and Y. Hasegawa. *Vide*, v. 12, no. 70, July-Aug. 1957, p. 230-246.

Design of the microwave triodes; construction technique. Tube characteristics and performance. Low frequency performance as an oscillator.

5372* (English and French.) **A Magnetron Controlled by a Symmetrically-Coupled TE_{011} Mode Cavity.** J. Feinstein and R. J. Collier. *Vide*, v. 12, no. 70, July-Aug. 1957, p. 247-254.

Principles of operation of the coaxial cavity coupled anode structure. Mode spectrum and mode suppression techniques. Operating characteristics.

5373* (French.) 8 mm - 40 kW - 12 W Magnetron. **Magnétron 8 mm - 40 kW - 12 W.** R. Juillerat and A. Regeffe. *Vide*, v. 12, no. 70, July-Aug. 1957, p. 255-260.

Production of a 40 kw. device starting from the 15 kw. magnetron. Cross section of magnetron MG 9T1. Performance characteristics, measuring circuits, and operation.

5374* (French and German.) The Dimensioning Problem of "Turbator" Magnetrons in Telecommunication Apparatus. **Zur dimensionierungsfrage der turbatoren (magnetrons) für nachrichten-gerate.** H. Paul. *Vide*, v. 12, no. 70, July-Aug. 1957, p. 261-268.

Theoretical description. Temporal and spatial phases, conditions of operation, and construction for 8000 to 12,000 hr. life.

5375* (English and French.) **Reflex Klystron With a Wide Mechanical Tuning Range for the Millimeter Region.** E. D. Naumenko. *Vide*, v. 12, no. 70, July-Aug. 1957, p. 269-272.

Construction of experimental reflex tubes to be used in measuring equipment; continuous covering of the 7 to 19 mm. range with approximately 5 m.w. of output power. Difficulties of construction. Operation of the klystron at wavelengths shorter than 7 mm.

5376* (French.) Progressive Wave High Power, Amplifiers and Oscillators of Types O and M. **Sur les tubes à onde progressive de grande puissance, types O et M amplificateurs et oscillateurs.** P. Guenard and O. Doehler. *Vide*, v. 12, no. 70, July-Aug. 1957, p. 273-277.

Comparison of the characteristics of different types of hyperfrequency power tubes, triodes, tetrodes, klystrons, and magnetrons. Yield, maximum voltage, sensitiveness to charge and voltage, band width, and life.

5377* (English and French.) **Some New Circuits for High-Power Traveling-Wave Tubes.** M. Chodorow and R. A. Craig. *Vide*, v. 12, no. 70, July-Aug. 1957, p. 278-283.

A study of new types of propagating circuits suitable for high-power traveling wave tubes. Two slow-wave structures, the helix, and the periodically loaded wave guide were considered.

5378* (English and French.) **Development of Traveling-Wave Amplifier Tubes at Federal Telecommunication Laboratories.** A. G. Clavier, O. Boychenko, and R. W. Wilmarth. *Vide*, v. 12, no. 70, July-Aug. 1957, p. 284-293.

Description and use of a loaded coaxial line tube. Tubes using the helix type of structure in the frequency range from 4400 to 5000 Mc.

5379* (English and French.) **Traveling-Wave Tubes 4 W 85 and 4 W 86 Used in the Microwave Radio Relay Link Tokyo-Osaka.** S. Hayashi, K. Sato, D. Kobayashi, and H. Nishio. *Vide*, v. 12, no. 70, July-Aug. 1957, p. 294-300.

Good results were due to the ample gain and output power specified in their design, the use of cathodes with very large surface area, the careful outgassing of parts, and excellent vacuum and tube operation under light load.

5380* (English and French.) **High Gain and Medium Power Traveling-Wave Tube, ECL—1140.** K. Sato, D. Kobayashi, S. Hamada, and Y. Uji. *Vide*, v. 12, no. 70, July-Aug. 1957, p. 301-307.

Use of a rectilinear gun with a supply cathode; concentricity of the electron gun and the helix. Gain and output power as a function of pitch of helix. Suppression of oscillation and echo distortion. Characteristics of the ECL—1140.

5381* (English and French.) **Very-Low-Noise Traveling-Wave Tube.** E. W. Kinaman and M. Magid. *Vide*, v. 12, no. 70, July-Aug. 1957, p. 308-317.

Noise figure, general explanation of noise, and noise reduction methods. Structural details of tube, low-noise tube design, and test results. Matching, voltage variation, and saturation characteristics.

5382* (French.) Millimetric Carcinotrons. **Carcinotrons millimétriques.** J. Laborderie, G. Vincent, and T. Yeou. *Vide*, v. 12, no. 70, July-Aug. 1957, p. 318-326.

Problems of the carcinotron O at high frequencies. General structure of the delay lines, coupling processes, and attenuation. Electronic dimensions, different types of tubes, and industrial applications.

5383* (French and German.) A Contribution to the Calculation of Permanent Magnets Used With Traveling-Wave Tubes. **Beitrag zur berechnung von permanentmagneten unter besonderer berücksichtigung der Magnetformen für lauffeldröhren.** L. Brück. *Vide*, v. 12, no. 70, July-Aug. 1957, p. 327-335.

Analogy between the magnetic flow and the electric current as applied to a permanent magnet. Study of some types of magnet for traveling wave tubes.

5384* (French.) Ion Tubes in Hyperfrequency Technique. **Les tubes ioniques dans la technique des hyperfréquences.** J. Lecorguillier. *Vide*, v. 12, no. 70, July-Aug. 1957, p. 336-340.

Noise tubes and ionic noise tubes. Differences between tubes. Variation during operation with constant current. Effect of the inside gas pressure, the surrounding temperature, and the loading current. Field indicator-tubes. Construction and applications.

5385* (English and French.) **Research and Development of Microwave Tubes in Japan.** Y. Koike and Y. Nakamura. *Vide*, v. 12, no. 70, July-Aug. 1957, p. 356-370.

Triodes. Survey of theoretical studies. Osaka tube. Klystrons, design of operation, circuits, applications, and two beam klystrons. Traveling wave tubes. Magnetrons.

5386* An Electronic Multiplex to Teleprinter Signal Translator. Guy Fontaine. *Western Union Technical Review*, v. 12, Jan. 1958, p. 7-11.

The time-division multiplex method is described, by which a number of telegraph channels are operated over a single circuit facility.

5387* Letterfax Equipments for Service Flexibility. Archie S. Hill. *Western Union Technical Review*, v. 12, Jan. 1958, p. 14-20.

Some of the letterfax transmitters, recorders, and auxiliary equipments are described.

5388* (German.) Magnetic Susceptibility of Foreign Atoms in Semiconductors. Theoretical Statement. **Magnetische Suszeptibilität von Fremdatomen in Halbleitern. Theoretische Betrachtungen.** D. Geist. *Zeitschrift für Naturforschung*, v. 12a, no. 11, Nov. 1957, p. 873-876.

See also: **5264** (semiconductor manufacture); **5447** (auroral radar); **5462** (ionosphere refraction of radio waves); **5463** (radar observation of atmospheric phenomena); **5722** (oscillatory magnetic resistance in *n*-type InSb); **5963** (active, adjustable audio bandpass filter); **6030** (foamed plastics in mounting plates); **6071** (capacitor microphone membrane).

ENGINEERING ECONOMICS

5389 Cottonseed and Competing Vegetable Oils. Leonard Smith and David Hull. *American Oil Chemists' Society, Journal*, v. 35, Jan. 1958, p. 14-19.

Significant trends over recent years in the total U. S. consumption of cottonseed and competing vegetable oils.

5390 Engineering Enrollment in the United States. Norman N. Barish, editor. 226 p. 1957. New York University Press. (T73 B23e)

Basic statistics on enrollment trends in engineering education and some possible interpretations of these trends.

5391 Federal Funds for Science. VI. The Federal Research and Development Budget, Fiscal Years 1956, 1957, and 1958. 60 p. 1957. Available from Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. (Q180.U5 N21f Vis.)

5392 Resources for the Future. Annual Report, 1957. 89 p. Resources for the Future, Inc., Washington, D. C. (Pamphlet File)

Water, energy, and mineral resources, land use and management.

5393 (English and French.) **Textiles—1954, 1955, 1956. Production and Consumption Statistics.** 133 p. 1957. Organisation for European Economic Co-Operation, Paris. (HD 9865 Or3t)

Tables show total production and consumption of various raw materials and yarns, also production and consumption by industry in the various European countries.

5394* Current Economic Developments in Europe. *United Nations Economic Bulletin for Europe*, v. 9, no. 3, 1957, p. 1-20.

Statistics on industrial and agricultural production and foreign trade.

See also: **6110** (spraying of jack pine pulp logs).

FLUID MECHANICS

5395 Axial Mixing in Pipes. L. J. Tichacek, C. H. Barkelew, and Thomas Baron. *A. I. Ch. E. Journal*, v. 3, Dec. 1957, p. 439-442.

The problem is treated by a modification of G. I. Taylor's analysis. The treatment includes the effect of both Schmidt and Reynolds numbers throughout the turbulent-flow range.

5396 Fluid Friction in Noncircular Ducts. J. E. Walker, G. A. Whan, and R. R. Rothfus. *A. I. Ch. E. Journal*, v. 3, Dec. 1957, p. 484-489.

Pressure drop due to fluid friction has been measured in a smooth tube, in six smooth concentric annuli, and between smooth, parallel, flat plates. Data cover the viscous, transition, and lower turbulent ranges of flow.

5397 Viscous Flow in Multiparticle Systems: Motion of Spheres and a Fluid in a Cylindrical Tube. John Happel and Howard Brenner. *A. I. Ch. E. Journal*, v. 3, Dec. 1957, p. 506-513.

An approximate theory for the behavior of multiparticle systems suspended in a viscous fluid is developed, based on a rigorous treatment for the case of a single sphere occupying any position in a cylindrical tube.

5398* (Russian.) An Asymptotic Solution of Equations for One-Dimensional Unsteady Motion of Ideal Gas With a Cylindrical Symmetry. **Asimptoticheskoe reshenie uravnenii odnomernogo neustanovivshegosia dvizheniia ideal'nogo gaza s tsilindricheskoi simmetriei.** G. M. Shefter. *Doklady Akademii Nauk SSSR*, v. 116, no. 4, Oct. 1, 1957, p. 572-575.

5399* (Russian.) An Attempt to Apply Tritium as an Indicator for Studying the Dynamics of Underground Waters. **Opyt primeneniia tritiia v kachestve indikatora dlia izucheniia dinamiki podzemnykh vod.** Ia. B. Finkel'shtein, V. A. Filonov, V. N. Soifer, and M. P. Obukhova. *Doklady Akademii Nauk SSSR*, v. 116, no. 4, Oct. 1, 1957, p. 671-672.

5400 A Deceleration Probe for Measuring Stagnation Pressure and Velocity of a Particle-Laden Gas Stream. Jules L. Dussourd and Ascher H. Shapiro. *Jet Propulsion*, v. 28, Jan. 1958, p. 24-34.

5401 Mass-Transfer Cooling of a Laminar Boundary Layer by Injection of a Light-Weight Foreign Gas. E. R. G. Eckert, P. J. Schneider, A. A. Hayday, and R. M. Larson. *Jet Propulsion*, v. 28, Jan. 1958, p. 34-39.

5402 Experimental Investigation of the Rotating Stall in a Single-Stage Axial Compressor. Jacques Valensi. *Journal of the Aeronautical Sciences*, v. 25, Jan. 1958, p. 1 + 10 pages.

Study of a compressor consisting of a row of 30 inlet guide vanes with solid body prerotation followed by a row of 31 rotor blades with constant work along radius, at design, and a row of 34 stator blades re-establishing conditions at rotor inlet.

5403 Incompressible Potential Flow About Axially Symmetric Bodies in Ducts. Philip Levine. *Journal of the Aeronautical Sciences*, v. 25, Jan. 1958, p. 33-36.

The velocity potentials and stream functions for a point source, doublet, ring source, ring doublet, disc source, disc doublet, and ring vortex are derived in an infinitely long duct of constant diameter.

5404* (Russian.) Boundary Layer Equations and Boundary Conditions for the Case of Hypersonic Flow in Rarefied Gases. **Uravneniia pogranichnogo sloia i granichnye usloviia k nim v sluchae dvizheniia v slabo razrezhennom gaze so sverkhzvukovymi skorostiami.** Iu. P. Lun'kin. *Prikladnaia Matematika i Mekhanika*, v. 21, no. 5, Sept.-Oct. 1957, p. 597-605.

By following the Prandtl theory, new equations were obtained which differ from the usual Prandtl equations by the presence of additional terms containing much higher derivatives of temperature and velocity; their normal pressure gradient differs from zero and is also expressed by additional terms.

5405* Non-Uniform Shear Flow Past Cylinders. James D. Murray. *Quarterly Journal of Mechanics and Applied Mathematics*, v. 10, Nov. 1957, p. 407-424.

The two shear distributions in the free stream can be approximated to the linear shear distribution and the shear present in an unretarded incompressible boundary layer.

5406* The Steady Two-Dimensional Flow of Viscous Fluid at Low Reynolds Numbers Passing Through an Infinite Row of Equal Parallel Circular Cylinders. K. Tamada and H. Fumikawa. *Quarterly Journal of Mechanics and Applied Mathematics*, v. 10, Nov. 1957, p. 425-432.

5407* The Moving Aerofoil in Shear Flow in the Neighbourhood of a Plane Boundary. D. E. Edmunds. *Quarterly Journal of Mechanics and Applied Mathematics*, v. 10, Nov. 1957, p. 448-464.

Case where the undisturbed fluid motion is that of linear shear flow parallel to the wall.

5408 Heat Transfer in a Laminar Boundary Layer With Constant Fluid Properties and Constant Wall Temperature. A. G. Smith and D. B. Spalding. *Royal Aeronautical Society, Journal*, v. 62, Jan. 1958, p. 60-64.

Simple method is applicable both to two-dimensional and to axisymmetric flows. Computation is by a quadrature.

5409 The Motion of a Simple Wedge Along the Water Surface. H. B. Squire. *Royal Society, Proceedings*, v. 243, ser. A, Dec. 10, 1957, p. 48-64.

Two-dimensional flow of a stream past a simple wedge partly immersed in water is investigated by linearized theory. The results are expressed in terms of a non-dimensional speed $V = U(\rho a/gL)^{1/4}$ where U is the velocity of the stream, ρ is the water density, a is the incidence of the sloping face and L is the lift on the wedge per unit beam.

5410 On Certain Integrals Occurring in a Hydrodynamical Problem. G. F. Miller. *Royal Society, Proceedings*, v. 243, ser. A, Dec. 10, 1957, p. 65-77.

Develops the mathematical theory of certain integrals involving Bessel functions, which occur in the problem of the movement of a planing wedge along a water surface.

5411 Effect of Oxygen Recombination on One-Dimensional Flow at High Mach Numbers. Steve P. Heims. *U. S. National Advisory Committee for Aeronautics, Technical Note* 4144, Jan. 1958, 52 p. (TL570 Un3t)

A theoretical analysis of air flow in a stream tube, in which O dissociation and recombination occur. Theory permits a finite reaction rate which varies from point to point along the flow.

5412 An Experimental Study of the Boundary Layer Behind a Moving Plane Shock Wave. W. A. Martin. *University of Toronto, Institute of Aerophysics, UTIA Report No.* 47, May 1957, 65 p. (TL570 T64.84a Vis.)

Study made of the shock tube boundary layer between the initial shock wave and the contact region indicated that the region was almost completely occupied by turbulent boundary layer.

5413* (English.) **Theory of Oscillation Type Viscometers. The Oscillating Cup. I-II.** Joseph Kestin, Gordon Frank Newell, and David Alan Beckwith. *Zeitschrift für Angewandte Mathematik und Physik*, v. 8, no. 6, Nov. 1957, p. 433-465.

Considers particularly viscometers in which a finite circular cylinder oscillates in contact with a fluid. Relationship of density and viscosity to the frequency and logarithmic decrement of the oscillation and various physical properties of the suspension system. Relationships for cups of various shapes and sizes.

FOOD TECHNOLOGY

5414* The Kinetics of Bacterial Inactivation by Heat. S. E. Charm. *Food Technology*, v. 12, Jan. 1958, p. 4-8.

Inactivation energy varies with different species of bacteria, but is essentially constant with temperature. Increase in inactivation rate with increase in temperature is due to the increase in the number of collisions per unit time between surrounding water molecules and sensitive volumes as well as to the increase in numbers of water molecules possessing the energy of inactivation.

5415* Factors Affecting Quality of Prepackaged Meat. II. Color Studies. D. Effects of Nitrogen and Carbon Dioxide Under Different Pressures Upon Color of Product. John A. Rikert, C. Olin Ball, and Elizabeth F. Stier. *Food Technology*, v. 12, Jan. 1958, p. 17-23.

Flushing storage atmospheres with CO_2 or N before vacuum storage had a beneficial effect on color of both fresh and cured meats. High CO_2 partial pressures maintained the color of cured meat better than high N pressures.

5416* Antioxidant in Malt and Malt Sprouts. Dwight L. Baker and Nison N. Hellman. *Food Technology*, v. 12, Jan. 1958, p. 33-35.

Evidence is presented to show that malt product flours serve as antioxidants for edible oils. In addition to its antioxidant activity, malt may provide flavoring, enzymatic activity, and coloring to the degree desired.

5417 Use of γ-Radiation for Preventing the Sprouting of Potatoes. W. G. Burton and R. S. Hannan. *Journal of the Science of Food and Agriculture*, v. 8, Dec. 1957, p. 707-715.

Gamma irradiation suppresses sprouting, but may also have harmful effects. After storage for 6 months or more, sweetening rendered the tubers unsuitable for crisp or chip production. After 15 months, a great accumulation of sugar and complete breakdown have been observed.

5418 Enzymes in Canned Stone Fruit, Their Survival and Their Effect on Corrosion of the Cans. Denis Dickinson. *Journal of the Science of Food and Agriculture*, v. 8, Dec. 1957, p. 721-726.

Stone fruit: plums, greengages, and cherries, which contain β-glucosidase corrode lacquered tinplate cans more rapidly if the heat process used is insufficient to inactivate the enzyme.

5419 Process Engineering in the Food Industries. R. J. Clarke. 355 p. 1957. Heywood and Co., Ltd., London. (TP370 C55p)

Text for those who are responsible for the management of food processing plants, for ordering equipment for such plants, and for the improvement of performance of existing plant installations.

FUELS AND COMBUSTION

5420* (French.) Chemical Research Concerning the Softening of Coking Coal. **Recherches chimiques concernant le ramollissement des charbons cokefiants.** I. G. C. Dryden and K. S. Pankhurst. *Annales des Mines de Belgique*, 1957, no. 11, Nov., p. 1064-1066.

Yield of extract and wetting heat of carbonized coal before and after extraction with chloroform. Effect of the carbonization time at 420 C on the loss of weight before extraction. Formation and stability of plasticizing products. Hydroxyl content.

5421* (French.) Relationship Between Graphitization and the Surface Properties of Carbons and Cokes. **Relation entre la graphitisation et les proprietes de surface de carbones et de cokes.** M. Letort. *Annales des Mines de Belgique*, 1957, no. 11, Nov., p. 1070-1072.

The graphite methane group brought forth a new type of low temperature adsorption isotherm, characterized by a development indicating the formation of a second adsorbed layer and by an accident corresponding to the formation of a third layer.

5422 Four Methods of Determination of Carbon Dioxide in Solid Fuels. Peter O. Krumin and Karl Svanks. *ASTM Bulletin*, 1958, no. 227, Jan., p. 51-57.

A comparative study of apparatus and procedures for gravimetric, titrometric, gas-volumetric, and pressometric methods.

5423* Mechanisms for the Formation of Ions in Flames. H. F. Calcote. *Combustion and Flame*, v. 1, Dec. 1957, p. 385-403.

Summary of the mechanisms of ion formation in flames and some new proposals on cumulative and chemi-ionization.

5424* Studies on the Oxidation of Hydrocarbons Under Extremely Clean Experimental Conditions. Z. G. Szabó and D. Gál. *Combustion and Flame*, v. 1, Dec. 1957, p. 404-419.

By using certain catalytic effects, attempts were made to increase the amounts of the single intermediates selectively and from the mode of action of the catalyst, deductions on the mechanism of the original reaction and on the nature of the catalyzed elementary steps were made.

5425* Determination of Burning Velocity of Pentaborane-Oxygen-Nitrogen Mixtures. W. G. Berl, et al. *Combustion and Flame*, v. 1, Dec. 1957, p. 420-430.

Freely propagating laminar flame kernels produced by spark ignition are photographed by the flash schlieren technique.

5426* An Isotopic Tracer Study of Carbon Formation in Hydrocarbon Flames. R. E. Ferguson. *Combustion and Flame*, v. 1, Dec. 1957, p. 431-437.

Experimental study of the hypothesis that C_2H_2 is the last stable precursor to carbon in rich premixed hydrocarbon flames by the isotopic composition of the carbon (or soot) formed in closed bomb explosion flames of propane-2-^{13}C.

5427* A Theory of Flame Propagation Limits Due to Heat Loss. E. Mayer. *Combustion and Flame*, v. 1, Dec. 1957, p. 438-452.

Flame propagation limit criteria are deduced for the special cases of convective heat loss applicable to flame quenching in a circular tube, and radiative heat loss applicable to free flames near the composition limit.

5428* Interpretation of the Sample Taken by a Probe in a Laminar Concentration Gradient. A. A. Westenberg, S. D. Raezer, and R. M. Fristrom. *Combustion and Flame*, v. 1, Dec. 1957, p. 467-478.

A theoretical study is described in which the situation is approximated by a point sink located in a two-dimensional flow field containing a concentration gradient of a binary mixture.

5429* (Russian.) Burning of High Viscosity Cracking Residue Products in the Cracking Plant Furnace. **Szhiganie vysokoviazkikh kreking-ostatkov v topke pechi kreking-ustanovki.** B. I. Liberov. *Energeticheskii Biulleten'*, 1957, no. 12, Dec., p. 12-21.

Studies possibility of using the cracking plant furnace for burning plant residue products.

5430* (German.) Production of Olefin Gases by the Cracking of Hydrocarbons. **Erzeugung von olefinischen Gasen durch Spaltung von Kohlenwasserstoffen.** Herbert Pietsch. *Erdöl und Kohle*, v. 10, no. 12, Dec. 1957, p. 837-840.

A method is described for the production of ethylene by cracking hydrocarbons in the presence of O. The reaction ratio for the simplest and optimum cases of this cracking at 927 C is given.

5431* (German.) Experiments in Cracking Liquid Hydrocarbons by the Electric Arc. **Versuche über die Spaltung flüssiger Kohlenwasserstoffe im Lichtbogen.** Gustav A. Fester, Enzo A. Martinuzzi, and Armando I. A. Ricciardi. *Erdöl und Kohle*, v. 10, no. 12, Dec. 1957, p. 840-842.

Zinc, Hg, and Pb cathodes in electric arc cracking of petroleum or diesel fuels showed much higher yield of C_2H_2 than Fe, graphite, and Cu electrodes. An Al electrode showed only half as much yield.

5432* (German.) Method of Testing the Suitability of Oils for Catalytic Gasification. **Ein Verfahren zur Prüfung von Ölen auf ihre Eignung zur katalytischen Ölvergasung im Kleinversuch.** Siegfried Schubert and Klaus Günther. *Gas- und Wasserfach*, v. 98, Ausgabe Gas, no. 49, Dec. 6, 1957, p. 1224-1227.

Description of the equipment and method as well as results of several experiments.

5433* (German.) A Contribution Toward the Knowledge of the Baking and Coking Capacity of Pit Coal. **Beitrag zur Kenntnis des Back- und Kokungsvermögens von Steinkohle.** Herbert Barking and Constanz Eymann. *Gas- und Wasserfach*, v. 98, Ausgabe Gas, no. 51, Dec. 20, 1957, p. 1271-1272.

Test results in the production of iron coke from the Walsum Mining Co. works.

5434* (German.) Formation of Coal Tar During the High Temperature Coking of Pit Coal. **Die Bildung des Steinkohlenteers während der Hochtemperaturverkokung der Steinkohle.** Fritz Rosendahl. *Gas- und Wasserfach*, v. 99, Ausgabe Gas, no. 1, Jan. 3, 1958, p. 2-12.

A survey of the subject and a theory of the process.

5435* The Koppers-Totzek Gasification Process. Hans Heinrich Koppers. *Institute of Fuel, Journal*, v. 30, Dec. 1957, p. 673-680 + 2 plates.

Installation and working of a plant for the gasification of all kinds of fuel are briefly described and some of the more important points of procedure are emphasized. Operating results are given for a Finnish plant.

5436* (French.) Gasification With Oxygen Enriched Air. **Gazéification a l'air enrichi en oxygène.** R. Alleyrac, L. de Saint Martin, R. Veuve, and P. Leroy. *Institut de Recherches de la Sidérurgie, Publications*, ser. A, no. 173, Sept. 1957, 74 p. (TN602 In7p Vis.)

Results of a 29% overoxygenation in a gas generator. Effects a 15.5% improvement in open-hearth furnace operation, a 13% decrease in coal consumption, and a slight cost decrease. Maximum O consumption is 36 m³/t.

5437* (Russian.) Relation Between the Quantity of Coke Forming During Catalytic Cracking, Based on an Alumino-Silicate Ball Catalyst, and the Technological Parameters of a Plant. **Zavisimost' velichiny koksoobrazovaniia pri kataliticheskom krekinge na aliumosilikatnom sharikovom katalizatore ot parametrov tekhnologicheskogo rezhima ustanovki.** B. V. Polianin. *Khimiia i Tekhnologiia Topliva i Masel*, 1957, no. 12, Dec., p. 32-38.

Attempts to give a practical method for calculating depth of the cracking process with simultaneous changes of several technological parameters.

5438* (Russian.) Production of Hydrogen by Continuous Thermal Decomposition of Hydrocarbon Gases. **Poluchenie vodoroda nepreryvnym termicheskim razlozheniem uglevodorodnykh gazov.** V. B. Ioffe and L. S. Zaglodin. *Khimiia i Tekhnologiia Topliva i Masel*, 1957, no. 12, Dec., p. 52-56.

Basic principles of the method are stated, as well as equipment and construction schemes.

5439* (Russian.) Alterations of Heat- and Temperature Conductivity of Coals During Their Heating. **Izmenenie teploprovodnosti i temperaturoprovodnosti pri nagrevanii uglei.** A. A. Agroskin. *Khimiia i Tekhnologiia Topliva i Masel*, 1957, no. 12, Dec., p. 57-64.

Study of conductivity of coals at temperatures from 300 to 600 C.

5440* (Russian.) The Effect of Coal Tar Pitch Coking Temperature on the Yield of Coal Tar Pitch Coke. **Vliianie temperatury koksovaniia peka na vykhod pekovogo koksa.** G. P. Gorovoi. *Koks i Khimiia*, 1957, no. 12, p. 30-31.

5441 The Thickness of Laminar Flames in Pre-Mixed Reactants: Optical Considerations. F. J. Weinberg. *Royal Society, Proceedings*, v. 243, ser. A, Dec. 10, 1957, p. 107-118.

Deflections occasioned by refractive index fields, make apparent thicknesses of luminous zones always in part optical illusion. Expressions in terms of burning velocity, flame geometry, and physical properties of the reactants are derived for the apparent thickness of an idealized luminous zone of no real thickness.

5442* (Polish.) Using Dry Methods in Desulphurizing Coke Gas. **Odsiarczanie gazu koksowniczego metodami suchymi.** A. Maj. *Wiadomości Hutnicze*, v. 13, no. 11, Nov. 1957, p. 336-340.

Extraction of sulphuric compounds in coke gas. Role of S in gas. Basic method of gas desulphurization. Gas purification by means of meadow ore or activated carbon.

5443* (Polish.) Wet Coke Gas Desulfurization. **Mokre oczyszczanie gazu koksowniczego z siarki.** Aleksander Maj. *Wiadomości Hutnicze*, v. 13, no. 12, Dec. 1957, p. 353-357.

Description of three basic methods: carbon method based on the absorption of H_2S, $(CN)_2$, and CO_2; carbon-steam method using sulfur with H_2S; Thylox method with an As or NH_3 solution as absorbers.

See also: **4796** (microstructure of coke); **5230** (flame failure protection); **5506** (flame propagation and quenching); **6105** (pulsations in furnaces); **6106** (pulsations in furnaces).

GEOLOGY, GEOPHYSICS, MINERALOGY, AND MINING ENGINEERING

5444* (Russian.) Some Resonance Phenomena in Seismic Vibration Pickups With Fluid Damping. **Nekotorye rezonansnye iavleniia v vibrodatchikakh seismicheskogo tipa s zhidkostnym uspokoeniem.** V. A. Radzievskii. *Akademiia Nauk Ukrains'koi RSR, Dopovidi*, 1957, no. 6, p. 552-557.

A simplified approximate theory of the phenomena is given, and semi-empirical formulas are obtained for determining the frequency regions where the resonances are observed.

5445* New Developments in Radioactive Well-Logging Research. Richard L. Caldwell and Robert F. Sippel. *American Association of Petroleum Geologists, Bulletin*, v. 42, Jan. 1958, p. 159-172.

Studies of the nuclear properties of common earth elements should improve interpretation of existing radioactive logs and provide the basis for new, improved methods of logging.

5446 Utilization of Satellite Observations in Weather Analysis and Forecasting. William K. Widger, Jr. and C. N. Touart. *American Meteorological Society, Bulletin*, v. 38, Nov. 1957, p. 521-533.

The meteorological data which can be expected from artificial satellites of relatively sophisticated types are discussed, with associated problems in observing and handling such data.

5447 A Continuously Recording Automatic Auroral Radar. A. G. McNamara. *Canadian Journal of Physics*, v. 36, Jan. 1958, p. 1-8.

A simple, low-power 50 Mc./s. radar was designed for automatic recording of radio reflections from auroral ionization.

5448 Diurnal Variations in the Number of Shower Meteors Detected by the Forward-Scattering of Radio Waves. III. Ellipsoidal Theory. C. O. Hines. *Canadian Journal of Physics*, v. 36, Jan. 1958, p. 117-126.

5449* (German.) History of Meteorites From Isotopic Measurements. **Über die Geschichte der Meteorite aus Isotopenmessungen.** Johannes Geiss. *Chimia (Switzerland)*, v. 11, no. 12, Dec. 1957, p. 349-363.

Evidence for the presence of normal gases in meteorites. Cosmic ray produced isotopes of gases. Determining "radiation ages" by measuring the He^3/H^3 ratio. Effect of short time variations of the cosmic ray flux.

5450 Crevasse Detector Blazes Glacial Trails. H. P. Van Eckhardt. *Electronics*, v. 31, Jan. 17, 1958, p. 63-65.

Sled electrodes, in contact with the ice-snow surface, set up an electrical field in ice pack and pick up constant readings when ice is solid and safe for travel.

5451* (Russian.) The Soviet Earth Satellites. **Sovetskie iskusstvennye sputniki zemli.** V. V. Dobronravov. *Elektrichestvo*, 1957, no. 12, Dec. 1957, p. 1-2.

Sizes, orbits, and equipment are described.

5452* (German.) Study of the Effect of Contact Surface and of Contact Angle on the Displacement of Oil by Water in Porous Bodies. **Untersuchungen Zum Einfluss von Grenzflächenspannung und Randwinkel auf die Verdrängung von Öl durch Wasser in porösen Korpern. I.** Theoretical Basis of the Experiments. **Theoretische Grundlagen und Versuchsdurchführung.** Wolf Engelhardt and Heino Lübben. *Erdöl und Kohle*, v. 10, no. 11, Nov. 1957, p. 747-752.

5453 The Galactic Novae. Cecilia Payne-Gaposchkin. 336 p. 1957. Interscience Publishers, New York. (QB841 G15g)

All pertinent information available is summarized and evaluated.

5454* (English.) **On the Geochemistry of Germanium.** Sayed A. El Wardani. *Geochimica et Cosmochimica Acta*, v. 13, no. 1, 1957, p. 5-19.

Provides data on the Ge content of chondrites, iron meteorites common igneous rocks, sedimentary rocks, and thermal spring waters.

5455* (English.) **The Geochemistry of Cobalt.** R. S. Young. *Geochimica et Cosmochimica Acta*, v. 13, no. 1, 1957, p. 28-41.

A summary and review of the occurrence of Co in rocks, minerals, and soils.

5456* Magmatic, Connate, and Metamorphic Waters. Donald E. White. *Geological Society of America, Bulletin*, v. 68, Dec. 1957, p. 1659-1682.

Reviews the characteristics of different kinds of "deep" water.

5457 Glossary of Geology and Related Sciences. 325 p. 1957. American Geological Institute, Washington, D. C. (QE5 Am35g)

Contains definitions of terms used in geology and related fields.

5458 Measurements of Solar Radiation and Atmospheric Attenuation at 4.3-Millimeters Wavelength. Robert J. Coates. *I.R.E., Proceedings*, v. 46, Jan. 1958, p. 122-126.

5459 A Swept-Frequency Interferometer for the Study of High-Intensity Solar Radiation at Meter Wavelengths. J. P. Wild and K. V. Sheridan. *I.R.E., Proceedings*, v. 46, Jan. 1958, p. 160-171.

Instrument is capable of measuring the one-dimensional position and angular size of a transient source on the sun's disk, and of determining the polarization and intensity of the received radiation.

5460 The Distribution of Cosmic Radio Background Radiation. H. C. Ko. *I.R.E., Proceedings*, v. 46, Jan. 1958, p. 208-215.

Results of a survey of cosmic radio background radiation at 250 Mc. using a 96-helix radio telescope.

5461 Planetary and Solar Radio Emission at 11 Meters Wavelength. John D. Kraus. *I.R.E., Proceedings*, v. 46, Jan. 1958, p. 266-274.

5462 The Use of Radio Stars to Study Irregular Refraction of Radio Waves in the Ionosphere. H. G. Booker. *I.R.E., Proceedings*, v. 46, Jan. 1958, p. 298-314.

5463* VHF Radar Echoes Associated With Atmospheric Phenomena. G. C. Rumi. *Journal of Geophysical Research*, v. 62, Dec. 1957, p. 547-564.

VHF radar observations during the summer and the fall of 1955 at Ithaca, New York, gave useful information not only about lightning, meteors, and aurora, but also about the possible existence and characteristics of "upward discharges" from the top of the troposphere to the bottom of the ionosphere.

5464* An Appraisal of Photon Counter Measurements of Upper Atmosphere Parameters. Gustavus J. Simmons. *Journal of Geophysical Research*, v. 62, Dec. 1957, p. 565-571.

Concludes that densities given by photon counting techniques are probably consistently low.

5465 Summary of Analytical Results From the HASL Strontium Program, July Through December 1956. John H. Harley, Edward P. Hardy, Jr., Ira B. Whitney, and Merril Eisenbud. *New York Operations Office (U. S. Atomic Energy Commission)*, NYO-4862, Mar. 1957, 44 p. (UF767 U3ny Contin.)

5466 Non-Graphical Solution of Back-Pressure Tests on Gas Wells. H. N. Dunning, R. W. Smith, and C. J. Walker. *Petroleum Engineer (Management Ed.)*, v. 30, Jan. 1958, p. B77 + 2 pages.

Gas well characteristics are calculated directly from the back-pressure equation, allowing use of computers to save time and avoid graphical approximation. .

5467 Initial Stages in the Propagation of Cosmic Rays Produced by Solar Flares. R. Lüst and J. A. Simpson. *Physical Review*, v. 108, ser. 2, Dec. 15, 1957, p. 1563-1576.

The propagation of solar cosmic rays produced in the February 23, 1956 flare was studied from the time the rays leave the flare region to the time when the terrestrial cosmic-ray intensity reaches a maximum value. Experimental results, and calculations of orbits connecting the sun and earth at the time of the flare, show that there are broad impact zones on the earth within the first ten minutes of the cosmic-ray intensity increases.

5468* (English.) **On the Properties of Long-Gap Streamers.** Kanji Honda. *Physical Society of Japan, Journal*, v. 12, no. 12, Dec. 1957, p. 1403-1412.

Systematic explanation of long-gap streamers including step-leaders of lightning discharge, giving various quantities concerning streamer properties as functions of "unbroken length".

5469* (English.) **Electrochemical Research on Paraffin Membranes. II. The Specificity of Special Paraffin Membranes as Calcium-Ion Electrodes.** H. J. C. Tendeloo and A. Krips. *Recueil des Travaux Chimiques des Pays-Bas*, v. 76, no. 11, Nov. 1957, p. 946-948.

A membrane consisting of a mixture of pure paraffin of low melting point, a Ca salt of low solubility in water, and a non-ionic detergent can be used as an electrode for the determination of Ca-ion concentrations.

5470 Response of Radiosonde Thermistors. Franklin I. Badgley. *Review of Scientific Instruments*, v. 28, Dec. 1957, p. 1079-1084.

The lag coefficient of a thermometer of cylindrical shape is shown to be approximately proportional to the one-half power of its diameter and inversely proportional to the one-half power of the product of ventilation speed and density of the environmental air. Radiation errors of one to several degrees may be expected in radiosonde temperature measurements at high altitudes.

5471* The Periodic Table of the Elements as a Basis of Geochemistry. S. I. Tomkeieff. *Science Progress*, v. 46, Jan. 1958, p. 46-62.

5472 Sea Temperature in the Gulf of Alaska in the Northeast Pacific Ocean, 1941-1952. Margaret K. Robinson. *Scripps Institution of Oceanography of the University of California, Bulletin*, v. 7, no. 1, 1957, 98 p. (GC1 Scr34b Vis.)

The results of the analysis of 16,103 individual bathythermograph temperature observations and 129 serial reversing thermometer observations in this area are presented.

5473* (Norwegian.) Satellites, a Problem From the Point of View of Classical Mechanics. **Satelitten som et problem fra den klassiske mekanikk.** Leif N. Persen. *Teknisk Ukeblad*, v. 104, no. 47, Dec. 19, 1957, p. 1067-1072.

Discussion on satellite orbits against the background of Kepler's law on planet motion. Effect of friction on the orbit of a satellite. Calculations with the help of two simplified models.

5474 Micro-Seismic Method of Determining the Stability of Underground Openings. Leonard Obert and Wilbur I. Duvall. *U. S. Bureau of Mines Bulletin* 573, 1957, 18 p. (TN21 Un3b)

Summarizes investigations made between 1940 and 1955. Characteristics of micro-seismims and the micro-seismic equipment are reviewed. Applicable problems are cited.

5475* (English.) **The Crystal Structure of Jamesonite, $FePb_4Sb_6S_{14}$.** N. Niizeki and M. J. Buerger. *Zeitschrift für Kristallographie*, v. 109, no. 5, Nov. 1957, p. 161-183.

5476* (German.) Intensity Measurements of X-Ray Interferences. **Zur Intensitätsmessung von Röntgeninterferenzen. II.** Geiger-Counter Diffractometer Measurements of Powder Specimens With the Aid of Crystal Reflected Monochromatic Radiation. **Zählrohrgoniometermessungen an Pulverpräparaten mit Hilfe von kristallreflektierter monochromatischer Strahlung.** Günter Leineweber and Erwin Hellner. *Zeitschrift für Kristallographie*, v. 109, no. 5, Nov. 1957, p. 198-203.

A method for measuring intensities with a Geiger-counter diffractometer. The addition of a monochromator permits the registration of the $CuK_{\alpha 1}$ radiation only.

5477* (English.) **Atomic Arrangements and Bonding Across a Twinning Plane in Graphite.** John R. Platt. *Zeitschrift für Kristallographie*, v. 109, no. 5, Nov. 1957, p. 226-230.

An atomic bonding scheme across the twinning plane in graphite is proposed, and the order of magnitude of the strain energy and activation energy for motion of the twinning plane is estimated.

See also: **5240** (transistorized earth satellite monitor); **5330** (radio astronomy coparison radiometer); **5531** (rainfall and dew recorder); **5824** (powder X-ray crystallography); **5949** (mining management problems).

GRAPHIC ARTS

5478* Wrap-Around Relief Plates for Offset and Direct Presses. E. A. Kilheffer. *American Pressman*, v. 68, Jan. 1958, p. 6-10.

5479* Letterpress & Magnesium. Harold W. Croisant. *American Printer and Lithographer*, v. 139, Jan. 1958, p. 38-39.

Some of the characteristics of Mg which make it desirable in printing and engraving are its light weight, press life equal to that of Cu, faster etching rates, and good machining characteristics.

5480* Colour Printing. Electronics Applied to Block-Making. *Electronic & Radio Engineer,* v. 35, Jan. 1958, p. 26-28.

Essential features of color-printing processes. Electronic methods of color correction.

5481* Which Is Better No-Offset Mix: Liquid or Powder? James A. West. *Inland Printer,* v. 140, Jan. 1958, p. 50 + 1 page.

Analyses of both and hints for using them in your plant.

5482 The Electrograph. R. A. Broding, J. D. Schroeder, and J. C. Westervelt. *Institute of Radio Engineers, Transactions on Instrumentation,* v. I-6, Dec. 1957, p. 220-224. (TK1 In6.6i Vis.)

Instrument is based on xerography, was designed for general laboratory use. The advantages of high sensitivity galvanometers, rectilinear recording, crossing of traces, timing lines, and other features unique to photographic oscillographs are offered, with the combined features of "quick look", immediate availability of records, elimination of darkrooms, etc., which are common to direct-writing recorders.

5483* (Russian.) Dispersion of Light by Photographic Emulsion Layers. **Rasseianie sveta sloiami fotograficheskikh emul'sii.** P. Kh. Pruss. *Izvestiia Akademii Nauk SSSR, Seriia Fizicheskaia,* v. 21, no. 11, Nov. 1957, p. 1526-1533.

Compares experimental and theoretical data. A relationship is established between the length of a given dispersed light wave and dispersion degree of the emulsion silver halide crystals.

5484* (Russian.) A Study of the Structural and Mechanical Properties of Photographic Emulsions in the Process of Drying. **Issledovanie izmeneniia strukturno-mekhanicheskikh svoistv fotograficheskikh emul'sii v protsesse sushki.** L. A. Lepilkina. *Kolloidnyi Zhurnal,* v. 19, no. 6, Nov.-Dec. 1957, p. 678-683 + 1 plate.

5485* Quality Control in Platemaking. Albert R. Materazzi. *Modern Lithography,* v. 26, Jan. 1958, p. 39 + 6 pages.

Inspection procedures; causes and prevention of defects and flaws.

5486 On the Effect of Granularity on Dynamic Range and Information Content of Photographic Recordings. Leo Levi. *Optical Society of America, Journal,* v. 48, Jan. 1958, p. 9-12.

Granularity data of photographic emulsions are used to determine the minimum usable spot size when the dynamic range or the number of discernible grey steps of the recording is specified, or the resulting dynamic range, if the resolution element size is specified.

5487 Quantitative Evaluation of Photo Interpretation Keys. R. De Lancie, W. W. Steen, R. E. Pippin, and A. Shapiro. *Photogrammetric Engineering,* v. 23, Dec. 1957, p. 858-864.

Determines the relative effectiveness of several types of keys, particularly Dichotomous and Selective Keys.

5488 The Effect of Photo Scale on the Accuracy of Forestry Measurements. Robert B. Pope. *Photogrammetric Engineering,* v. 23, Dec. 1957, p. 869-873.

The accuracy of tree height measurement and species identification on both panchromatic and color photographs was tested at scales ranging from 1:20,000 down to 1:2500.

5489 Proceedings of the Third International Congress on High-Speed Photography. R. B. Collins, editor. 417 p. 1957. Butterworths Scientific Publications, London. (TR5 In8p)

Papers deal with flash light sources; image splitting and image-sampling techniques; inertialess shutters; application to biology, medicine, hydrodynamics, aerodynamics, ballistics, and explosives; instrument aids; photographic materials; X-rays; film evaluation; schlieren and interferometric techniques; rotating mirror cameras; and medium repetition rate cameras.

5490* The Preparation or Regeneration of a Silver Bleach Solution by Oxidizing Ferrocyanide With Persulfate. Bernard A. Hutchins and Lloyd E. West. *Society of Motion Picture and Television Engineers, Journal,* v. 66, pt. 1, Dec. 1957, p. 764-768.

Method is applied to the preparation of fresh bleach or for regeneration of used bleach.

5491* A Method of Protecting Film and Lengthening Its Serviceable Life. Paul N. Robins. *Society of Motion Picture and Television Engineers, Journal,* v. 66, pt. 1, Dec. 1957, p. 772-774.

A process called Permafilm was developed to prevent film damage. Impregnated into the emulsion, the effect of the compound is to toughen the emulsion while maintaining its resiliency.

5492* (Russian.) Effect of Light on the Primary Centers of Photographic Layers. **Deistvie sveta na pervichnye tsentry fotograficheskogo sloia.** E. A. Kirillov and E. A. Nesterovskaia. *Zhurnal Nauchnoi i Prikladnoi Fotografii i Kinematografii,* v. 2, Nov.-Dec. 1957, p. 401-403.

5493* (Russian.) Spectral Photosensitivity of Non-Sensitized Photographic Emulsions. **O spektral'noi svetochuvstvitel'nosti nese-nsibilizirovannykh fotograficheskikh emul'sii.** B. G. Varshaver, L. Ia. Kraush, and K. V. Chibisov. *Zhurnal Nauchnoi i Prikladnoi Fotografii i Kinematografii,* v. 2, Nov.-Dec. 1957, p. 413-420.

Relation between the photosensitivity of AgBr emulsions and conditions of their chemical maturing: time, temperature, gelatine, and iodide content.

See also: **5218** (printing inks); **5226** (printing on tinplate); **5310** (continuous photographic wave recording); **5807** (lattice imperfections and photosensitivity).

HEAT POWER

5494* (Dutch.) Treatment of Water in Steam Boiler Systems. **Behandeling van water in stoomketelsystemen.** H. W. Hartog. *Bedrijf en Techniek,* v. 12, no. 293, Nov. 30, 1957, p. 854 + 10 pages.

Definition and aim of treatment. Heating and evaporation. Effects of incrustation. Corrosion. Feed water requirements. Elimination of hardness, salt, gases, and oil. Boiler water treatment. Muds. Further treatment of condensation products. Control.

5495* (Dutch.) Automation of the Stoking Process. **Automatische regeling van het stookproces.** M. J. van Eijkern. *Bedrijf en Techniek,* v. 12, no. 294, Dec. 14, 1957, p. 895 + 7 pages.

Description of different arrangements. Automation of the steam boiler. Requirements concerning the fuel and air supplies.

5496* (German.) Proposals for Uniform Design Conditions for Forced Draft Cooling Towers in Steam Power Stations. **Vorschlag für einheitliche Auslegungsbedingungen für Ventilatorkühltürme in Dampfkraftwerken.** Whilhelm Otte. *Brennstoff-Wärme-Kraft,* v. 9, no. 12, Dec. 1957, p. 573-575.

5497* (French.) Boiler Water Priming. Disadvantages, Causes, Prevention. **Le primage des eaux de chaudières. Inconvénients—causes—prévention.** J. Pierrey. *Chaleur & Industrie,* v. 38, no. 389, Dec. 1957, p. 305-317.

Description of "primage"; priming and foaming difficulties. Mechanical and chemical causes and corrections. Cases of antipriming application in industry.

5498 Circulating Water Systems of Steam Power Plants. R. T. Richards. *Combustion,* v. 29, Jan. 1958, p. 45-49.

Discusses some of the system hydraulic features which require special attention such as the economics of pumping, calculation of pumping head, hydraulic design of pump suction chambers, maximum siphon recovery, air binding, and water hammer.

5499* (French.) Short-Time Response Methods and Apparatus Used in the Study of Combustion. **Méthodes et Appareils à court temps de réponse utilisés dans l'étude de la combustion .**A. Moutet. *Flamme et Thermique,* v. 10, no. 110, Nov. 1957, p. 13 + 22 pages.

Describes rapid-response measuring apparatus usable in modern combustion chambers of the ram-jet and rocket type. Analysis

of chemical and physical changes during the combustion process.

5500* Manifold Injection in Diesel Engines. *Gas and Oil Power*, v. 52, Dec. 1957, p. 287 + 3 pages.

Reports research on a method of introducing part of the fuel in the form of a fine mist into the intake manifold, while the rest is introduced into the cylinder by a conventional high-pressure injection system.

5501 Shock Tube Technique for Study of Autoignition of Liquid Fuel Sprays. George J. Mullaney. *Industrial and Engineering Chemistry*, v. 50, Jan. 1958, p. 53-58.

Liquid fuel is injected in the zone of stationary gas at high pressure and temperature at the end of a shock tube after shock reflection has occurred. A window permits study of the autoignition process by high speed photography.

5502 Factors Which Influence the Suitability of Liquid Propellants as Rocket Motor Regenerative Coolants. D. R. Bartz. *Jet Propulsion*, v. 28, Jan. 1958, p. 46-53.

5503* (German.) Heat Transfer on Fins and Finned Cylinders. **Wärmeübergang an Rippen und Rippenzylindern.** K. Löhner and G. Choné. *MTZ; Motortechnische Zeitschrift*, v. 18, Dec. 1957, p. 373-377.

Data from the literature are evaluated, collected and expanded through newly computed nomograms and are arranged to suit present-day requirements. Equations and nomograms, necessary for heat transfer calculations under various conditions are presented. Special consideration is given to the determination of fin dimensions for maximum heat transfer.

5504* (German.) Particular Conditions of Heat Insulation in Gas Turbines. **Eigenheiten des Wärmeschutzes bei Gasturbinen.** Karl Seiffert. *MTZ; Motortechnische Zeitschrift*, v. 18, Dec. 1957, p. 389-394.

Technology of heat insulating materials. Application of high quality mineral fibers resisting temperatures over 1300 F for long periods. For much higher temperatures, fired diatomaceous earth is used. Thin coats of heat resisting fibers for special cases. Difficulties in the assembly of turbine insulation.

5505* (German.) Cooling of Gas Turbine Wheel Disks. **Kühlung der Scheiben von Gasturbinen.** I. T. Schwez and E. P. Dyban. *MTZ; Motortechnische Zeitschrift*, v. 18, Dec. 1957, p. 394-396.

Determining temperature distribution of disk and critical diameter for heat transfer. Flow of cooling air through narrow passages. Heat transfer and pressure losses in capillary passages. Calculation methods.

5506 Flame Quenching. B. S. Massey and B. C. Lindley. *Royal Aeronautical Society, Journal*, v. 62, Jan. 1958, p. 32-42.

Study covers means of ignition, ignition temperatures, velocity of propagation, experimental work on propagation in tubes and on limits of flammability of various hydrocarbons in air and O, as well as theoretical work on flame propagation and quenching.

5507* The Ramjet in Astronautics. S. W. Greenwood. *Spaceflight*, v. 1, no. 6, Jan. 1958, p. 211 + 5 pages.

The ramjet is considered as a possible engine in astronautics because of its low fuel consumption. Present limitations are extreme operational heat which is too much for current materials and heat transfer systems.

5508 Symposium on Vapor Phase Oxidation of Gasoline, 1956. 68 p. 1957. American Society for Testing Materials, Philadelphia. (TP690.45 Am35s)

Factors influencing deposits in intake portion of fuel system of gasoline engines. Induction-system gum. Method for studying effect of fuel composition upon intake valve deposit-forming characteristics. Effects of inhibition and environment on the induction-system oxidation of gasoline.

5509 Experimental Investigation of Turbojet-Engine Multiple-Loop Controls for Nonafterburning and Afterburning Modes of Engine Operation. Donald B. Kirsch, Leon M. Wenzel, and Clint E. Hart. *U. S. National Advisory Committee for Aeronautics, Technical Note* 4159, Jan. 1958, 61 p. (TL570 Un3t)

Good engine transient performance characteristics were obtained with a control system in which engine speed was controlled by manipulation of exhaust-nozzle area and turbine-discharge temperature was controlled by manipulation of engine fuel flow.

See also: **5247** (automatic gas turbine testing); **5665** (castings for diesel motors); **5900** (atomic powered ships).

INFORMATION—PREPARATION AND DISSEMINATION

5510 Colon Classification. v. I. Basic Classification. S. R. Ranganathan. 5th Ed. Sections individually paged. Madras Library Assn., London. (Z696 R16c)

A system of call numbers used to classify literature in India.

5511 The Layout of Technical Reports. A. H. Holloway, editor. Sections individually paged. 1957. North Atlantic Treaty Organization, Paris. (P7 H72L)

Recommendations by Documentation Committee for size, markings on cover and title page, contents list, pagination, notation, abstract, list of references, tables, illustrations, appendices, and index cards in technical reports.

5512* Mobilization of Existing Library Resources. William H. Carlson. *Library Trends*, v. 6, Jan. 1958, p. 272-295.

The mobilization of written materials by library methods; brief history of literature growth to present time. Methods of making literature known and available such as catalogs, lists of serials, and inter-library systems of loans.

5513* Increasing Library Resources Through Cooperation. Edward B. Stanford. *Library Trends*, v. 6, Jan. 1958, p. 296-308.

Suggests the advantage of coordinated acquisitions among colleges in close proximity. Gives some examples of coordinated acquisitions in college libraries.

5514* Cooperation Among Libraries of Different Types. Robert T. Grazier. *Library Trends*, v. 6, Jan. 1958, p. 331-342.

Libraries frequently compile lists of serials to disseminate information about holdings. Many times libraries coordinate their efforts by collecting material on certain fields to be loaned upon request to any of the other libraries in the coordinated group.

5515* Library Cooperation in Great Britain. J. Clement Harrison. *Library Trends*, v. 6, Jan. 1958, p. 352-364.

An account of the development of Britain's methods regarding inter-lending systems among libraries.

5516* The Relationship of Technical Writing and Library Functions. Karl A. Baer. *Special Libraries*, v. 49, Jan. 1958, p. 5-10.

5517* Library Aids to Technical Writing. B. H. Weil and L. B. Poland. *Special Libraries*, v. 49, Jan. 1958, p. 11-16.

Suggests ways in which the special librarian may be of assistance to the technical report writer.

See also: **6100** (rubber compounding information).

INSTRUMENTATION

5518 Inexpensive Automatic Recording Thermobalance. Wesley W. Wendlandt. *Analytical Chemistry*, v. 30, Jan. 1958, p. 56-58.

Construction and operation of instrument built from a torsion balance, 0- to 102-mg. capacity. Apparent accuracy for a 100-mg. sample was approximately 0.5%.

5519* Instrumentation for the Control of Process Streams in Some Atomic Energy Projects. H. Bisby. *British Institution of Radio Engineers, Journal*, v. 17, Dec. 1957, p. 697-704.

5520* (German.) Process Control by Continuous Infra-Red Gas Analysis. **Betriebsüberwachung durch kontinuierliche Ultrarot-Gasanalyse.** Heinz Hummel. *Chemie Ingenieur-Technik*, v. 29, no. 12, Dec. 1957, p. 776-780.

Description of a single beam infra-red analyzer. Production of an alternating beam by alternating pressure in a measuring vessel. Beam is measured by an alternating beam receiver and an alternating voltage amplifier.

5521* (German.) Determination of the Melting Point of Inorganic Substances. **Schmelzpunktbestimmung anorganischer Stoffe.** Rudolf Grewe. *Chemiker-Zeitung*, v. 81, no. 24, Dec. 20, 1957, p. 827.

Instrument measures with a precision of 0.5 to 1%. The range extends from 500 to 1500 C.

5522* A Novel Type of Saw for Cutting Quartz Crystals or Other Materials. J. E. Thwaites and C. F. Sayers. *Industrial Diamond Review*, v. 17, Dec. 1957, p. 233-236.

Consists of a thin metal annulus, charged with diamond powder on its inner edge and clamped at its outer edge to the face of a cup or chuck in such a fashion as to hold the thin metal annulus in radial tension.

5523 Refractive Index Measurements of Smokes and Aerosols. C. M. Crain, J. E. Boggs, and D. C. Thorn. *Institute of Radio Engineers, Transactions on Instrumentation*, v. I-6, Dec. 1957, p. 246-251. (TK1 In6.6i Vis.)

Describes apparatus used and results obtained in measurement of the index of refraction of aerosols of AgI, polystyrene spheres, Fe powder, and oil smoke at a frequency of 9400 Mc.

5524 Errors in X-Ray Sorting With a Double Crystal Goniometer. A. Mann and R. Spinrad. *Institute of Radio Engineers, Transactions on Instrumentation*, v. I-6, Dec. 1957, p. 251-257. (TK1 In6.6i Vis.)

The quantitative effect of misalignment and cutting errors is given, and a physical description and formulas are presented to allow insight into the mechanism of resolution deterioration.

5525* How to Measure Liquid Interface Levels. II. Electrical Methods of Interface Level Measurement. J. R. Hackman. *ISA Journal*, v. 5, Jan. 1958, p. 60-63.

Describes eight electric, sonic, and optic level meters, explaining the unique advantages of each.

5526 Concentration of the Solar Radiation in a Solar Furnace. Taro Hisada, et al. *Journal of Solar Energy Science and Engineering*, v. 1, Oct. 1957, p. 14-18 + 1 plate.

Results from photographic registration of the moon's flux, optical analysis based on the practical finishing of the present mirror surface, and actual experiment in observing the melting points of binary mixtures showed fair agreement.

5527 A Guidance System for a Solar Furnace. James G. Moore and Pierre St. Amand. *Journal of Solar Energy Science and Engineering*, v. 1, Oct. 1957, p. 27-29.

A system which will automatically track the sun about any two orthogonal axes.

5528 An Alpha Counter for Uniformity Measurements. F. A. White and J. C. Sheffield. *Knolls Atomic Power Laboratory (U. S. Atomic Energy Commission)*, KAPL-1828, July 1957, 11 p. (UF767 Un3.1ka Contin.)

An ionization-type counter is used to measure the uniformity of thin coatings of α-emitting materials to ± 1% exclusive of statistical error.

5529* (English.) **A Technique for the Examination of a Single Specimen in Both Light and Electron Microscopes Using Carbon Films.** D. E. Bradley. *Mikroskopie*, v. 12, nos. 7-8, Nov. 1957, p. 257-263.

5530 Measurement of Vertical Heights From Single Oblique Aerial Photographs. Sylvester P. Gay, Jr. *Photogrammetric Engineering*, v. 23, Dec. 1957, p. 900-908.

Nomographic methods for indirect measurement of vertical heights from images appearing on single-oblique aerial photographs are presented.

5531* A Seven-Day Instrument for Recording Periods of Rainfall and Dew. T. Theis and L. Calpouzos. *Phytopathology*, v. 47, Dec. 1957, p. 746-747.

A shaft extends from a hygrothermograph through the rainproof top of a ventilated box and connects to an arm holding a pencil. Pencils are used that make dark lines on wet ground-glass surfaces and light, indistinct lines on dry surfaces.

5532 Instrument to Measure Fluorescence Lifetimes in the Millimicrosecond Region. Seymour Steven Brody. *Review of Scientific Instruments*, v. 28, Dec. 1957, p. 1021-1026.

The instrument utilizes a hydrogen flash lamp and high-speed oscilloscope. The fluorescence decay is displayed on the oscilloscope and, using the method of moments, the observed fluorescence is corrected for the response of the lamp and the detection equipment.

5533 Ionization Gauges for Measuring Pressures up to the Millimeter Range. G. J. Schulz and A. V. Phelps. *Review of Scientific Instruments*, v. 28, Dec. 1957, p. 1051-1054.

Designing an ionization gage such that the electron paths are short and well-defined and that the collection efficiency of the ion collector is near unity, extends the range of ionization gages to pressure of the order of one mm. Hg.

5534* (Italian.) Anomalies in the Operation of Electric Resistance Strain Gages. **Alcune anomalie nel funzionamento degli estensimetri elettrici a variazione di resistenza.** Alfredo Castiglioni. *Ricerca Scientifica*, v. 27, no. 9, Sept. 1957, p. 2701-2707.

Difficulties of using the gages when temperature of an instrument is affected by the heat due to the flowing current. Effect on accuracy of measurements. Suggestions for improvement when measuring on models made of thermal insulating materials.

5535* (English.) **Interference Filters for the Infra-Red.** O. S. Heavens, J. Ring, and S. D. Smith. *Spectrochimica Acta*, v. 10, no. 2, Dec. 1957, p. 179-194.

Results obtained with multilayer filters employing Ge and cryolite. Present factors limiting range and performance of filters of this type.

5536* Making Precision Measurements With Optical Tools. J. C. Moody and J. M. Bunch. *Tool Engineer*, v. 40, Feb. 1958, p. 83-91.

The autocollimator is a versatile tool that can be used for both laboratory and shop measurements of flatness and angles.

5537 Air Density Corrections for Reduction of Weighings to Vacuo. Eric E. Johnson. *Union Carbide Nuclear Company (U. S. Atomic Energy Commission)*, Y-1181, Dec. 1957, 16 p. (UF767 Un3.1y Contin.)

Density of moist air for use in the reduction of weighings to vacuo is described and evaluated. Air density corrections employed in this method are derived.

5538* Recent Developments in Specimen Preparation Techniques for Electron Microscopy. V. E. Cosslett and R. W. Horne. *Vacuum (Annual Issue)*, v. 5, Oct. 1955, p. 109-130.

Deals with specimen supports, microtomes for ultra-thin sectioning, staining and freeze drying techniques, replication methods, techniques for the deposition of C films, and specimen preparation of inorganic materials.

5539* Applications of Vacuum Technique in Atomic Energy Research. A. H. Turnbull. *Vacuum (Annual Issue)*, v. 5, Oct. 1955, p. 131-156.

Reference is made to metallurgical applications, measurement of the gas content of metals, the production of thin films, vacuum technique in mass spectrometry, and high power R.F. valve manufacture. The vacuum systems of the proton linear accelerator and the Mark II heavy element electromagnetic separator are described.

5540* (German.) The Generation and Measurement of an Ultra-High Vacuum. **Die Erzeugung und Messung von Ultra-Hochvakuum. II.** F. A. Baker and J. Yarwood. *Vakuum-Technik*, v. 6, no. 8, Dec. 1957, p. 186-191.

Theoretical discussion of the pumping rate of an electrical pump and measuring of an ultra-high vacuum by means of an omegatron.

5541* (Polish.) Temperature Measurement by Means of a Steel Wire. **Pomiar temperatury za pomoca drutu stalowego.** Stefan Nowosielski. *Wiadomości Hutnicze*, v. 13, no. 12, Dec. 1957, p. 357-361.

A simple and economical method using a steel wire and an immersed thermocouple to determine the temperature of molten steel.

See also: **5243** (control of electric furnaces); **5824** (powder X-ray crystallography); **5883** (equipment for radioactivities of 10μ sec. to 1 sec. half-life); **5992** (thermal roughness comparator); **6020** (thermal conductivity apparatus); **6046** (plastic focusing sunlight collectors).

LUBRICATION AND FRICTION

5542 Engine Lubrication. *Automobile Engineer*, v. 48, Jan. 1958, p. 19-20.

Tests on Auto-Moly, a MoS_2 engine compound, under oil-starved and oil-free conditions.

5543* A Lubrication Engineer Surveys Steel Mill Gearing. II. A. E. Cichelli. *Lubrication Engineering*, v. 13, Dec. 1957, p. 633-639.

Deals with specific examples of pitting and wear in gears.

5544* Service Experience With a New Multipurpose Industrial Grease. S. R. Calish, Jr. *Lubrication Engineering*, v. 13, Dec. 1957, p. 640 + 7 pages.

Outlines the necessary performance characteristics for greases in many major industries and emphasizes the limiting environmental conditions for each. Examples of unusual or severe service are cited.

5545* A Field Study of Gas Engine Lubricants. C. M. Floyd. *Lubrication Engineering*, v. 13, Dec. 1957, p. 647-650.

Report field tests in both two-cycle and four-cycle gas engines, using both naphthenic and paraffinic base stocks, in detergent and non-detergent formulations. Effects of wear and cleanliness on engine are evaluated.

5546* A New Thickener for Multipurpose Lubricating Greases. R. J. Rosscup, D. R. Oberlink, and W. L. Hayne. *Lubrication Engineering*, v. 14, Jan. 1958, p. 16 + 3 pages.

Diamidocarbonyl (DAC) is prepared by reacting an isocyanate with an amine in a mineral oil suitable for grease use. The resultant greases have low thickener content in which the fibers resemble those of lithium soap. They possess high drop points and excellent resistance to oxidation, water, working, and leakage.

5547* Determination of Grease Consistency Using an Automatic Worker Viscometer. H. J. Connors. *Lubrication Engineering*, v. 14, Jan. 1958, p. 22 + 5 pages.

5548* Russian Research on Lubrication and Wear. Douglas Godfrey. *Lubrication Engineering*, v. 14, Jan. 1958, p. 27-31.

Russian research organizations and scientific publications. Results of research on the kinetics of formation of S, Cl, and P compounds on metals and their effect on wear as determined by the four-ball machine, and the effect of additives in cutting oil on the shearing aspect of cutting.

5549 Rules for Application of Needle Bearings. Richard Smith. *Machine Design*, v. 30, Jan. 9, 1958, p. 116-119.

Describes misalignment, deflection, thrust provision, location, lubrication, and sealing of needle bearings.

5550* The Development and Application of a Broad Performance Range Gear Lubricant Additive. R. K. Williams, W. C. Brandow, and J. W. Schulte. *NLGI Spokesman*, v. 22, no. 10, Jan. 1958, p. 8-14.

Outline of test procedures; road test operating conditions.

5551* Shear Stability of a Bentone Grease. H. F. Sutter. *NLGI Spokesman*, v. 22, no. 10, Jan. 1958, p. 18-21.

Effect of shear level on mechanical stability were studied.

5552 (Italian.) A Contribution to the Study of Lubricating Oils for Extreme Pressure by Means of the 4-Ball Testing Machines. **Contributo allo studio degli oli lubrificanti per carichi elevati (extreme pressure) mediante la macchina di prova a quattro sfere. III.** Mechanism of Action of Some Additives. **Meccanismo d'azione di alcuni additivi.** C. Paleari, C. Siniramed, and A. Girelli. *Revista dei Combustibili*, v. 11, no. 11, Nov. 1957, p. 715-734.

Discusses conditions of boundary lubrication as well as the mechanism of action of those additives which, through the formation of anti-wear or anti-welding films, prevent seizure of contact surfaces.

5553 Symposium on Steam Turbine Oils. 106 p. 1957. American Society for Testing Materials, Philadelphia. (TJ737 Am35s)

Seven papers deal with evaluation and performance of various turbine oils, antiwear requirements; rusting in turbine oil systems; rust-preventive additives; and a laboratory device for the water leaching of additives in turbine oils.

5554* Lubricants for Wire-Drawing Dies. I-II. W. M. Halliday. *Wire Industry*, v. 24, Dec. 1957, p. 1145 + 3 pages; v. 25, Jan. 1958, p. 59 + 2 pages.

Drawing-die design; bearing length; drawing effects on die life; die lubricant requirements. The forms of lubrication principally employed are dry lubricants in the form of a solid dry soap compound and wet lubricants, which may be a wet paste-like solution or emulsion.

See also: **5561** (lubrication of gears).

MECHANICAL ENGINEERING

5555* (English.) **Matrix Method for the Analysis of Piping Subject to Restrained Thermal Expansion.** Edmond Dony. *Acier, Stahl, Steel*, 1957, no. 12, Dec., p. 515-522.

5556* Selecting Structural Materials for Supersonic Flight. Donald D. Cox. *Aeronautical Engineering Review*, v. 17, Jan. 1958, p. 28-31.

Clarifies materials selection by showing the influence of configuration and design criteria on the choice of materials.

5557* Ultimate Strength Design Charts for Columns Controlled by Tension. Tung Au. *American Concrete Institute, Journal*, v. 29, Dec. 1957, p. 471-480; *ACI Proceedings*, v. 54, 1957, p. 471-480.

Basic design equations for eccentrically loaded concrete columns are based on the report of the joint ACI-ASCE committee on ultimate strength design.

5558* A Multi-Bay Single-Storey Warehouse Designed by the Plastic Method. Alan Watson. *British Welding Journal*, v. 4, Dec. 1957, p. 547-551.

An example of a structure designed by the plastic method, where simultaneous consideration must be given to the details of connections and to the fabrication procedure both in the shop and on the site.

5559* Engineering Materials Handbook. Charles L. Mantell, editor. Sections individually paged. 1958. McGraw-Hill, New York. (TA403 M31e Ref.)

Considers metals, organic materials, and inorganic materials from the viewpoint of engineering structures, machinery, and equipment. Emphasis is on the fabricated forms, their physical and mechanical properties, their adaptations, advantages, limitations, competition with each other, protection against deterioration, and durability.

5560* Applying the Electrodynamic Vibrator to the Development of Military Vehicles. John R. Prior. *General Motors Engineering Journal*, v. 5, Jan.-Feb.-Mar. 1958, p. 2-7.

The vibrator makes possible relatively inexpensive testing, good reproduction of actual operating conditions, and easier differentiation and isolation of various kinds of vibrations.

5561* Simulated Gear-Tooth Contacts: Some Experiments Upon Their Lubrication and Subsurface Deformations. A. W. Crook. *Institution of Mechanical Engineers, Proceedings*, v. 171, no. 5, 1957, p. 187-214 + 5 plates.

Details of experiments with disk machines in which the electrical resistance between the disks was measured at various stages of running, also experiments with mild steel disks run at such loads that considerable plastic deformation occurred. Some form of hydrodynamic lubrication is indicated.

5562* Self-Excited Vibration of Axial-Flow Compressor Blades. A. D. S. Carter and D. A. Kilpatrick. *Institution of Mechanical Engineers, Proceedings*, v. 171, no. 7, 1957, p. 245-281 + 6 plates.

Major factors governing vibration. Design rules for minimizing failures.

5563 The Crippling Strength of Compression Elements. George Gerard. *Journal of the Aeronautical Sciences*, v. 25, Jan. 1958, p. 37-52.

A review of a new method of crippling strength analysis.

5564* Boiler Feed Pumps for Supercritical Pressure. Hans Gartmann. *Mechanical Engineering*, v. 80, Jan. 1958, p. 51-54.

Design investigation and experimental research that went into the development of boiler feed pumps for a 125,000-kw. steam power plant using supercritical steam pressure of 4500 psi.

5565* The Analysis of Structures With Particular Reference to the Prediction of Deflexions. T. M. Charlton. *North East Coast Institution of Engineers & Shipbuilders, Transactions*, v. 74, Jan. 1958, p. 163-188.

A basic analytical method of finding deflections of statically determinate trusses is considered briefly and use of the principle of virtual work for finding deflections is demonstrated with reference to a truss and a simply suported beam.

5566 How Wrong Can Elastic Constants Be? S. A. Gordon. *Product Engineering*, v. 29, Jan. 6, 1958, p. 68-71.

Analysis of the effect of small variations in elastic constants as applied in eight common design equations shows why precise determinations are not always vital for accurate structure design.

5567 How to Design Multi-Rate Helical Springs. K. A. Flesher. *Product Engineering*, v. 29, Jan. 20, 1958, p. 76-78.

With two little-known methods, springs can be assembled in series to give a rate that varies during operation.

5568* Stability Limits for a Clamped Spherical Shell Segment Under Uniform Pressure. Robert R. Archer. *Quarterly of Applied Mathematics*, v. 15, Jan. 1958, p. 355-366.

An integration procedure for the differential equations for the finite deflections of clamped shallow spherical shells under uniform pressure is developed. Stability limits are obtained for a range of the central height to thickness ratio from about 1 to 35.

5569* Cylindrical Stress Waves in Flat Slabs. Norman Davids and Sudhir Kumar. *Quarterly Journal of Mechanics and Applied Mathematics*, v. 10, Nov. 1957, p. 465-481.

Detailed analysis of the determination of the various modes. Curves of both the non-dimensional phase and group velocities are given for Poisson's ratio from zero to half.

5570 Seals for Pressures to 10 000 Atmospheres. W. B. Daniels and A. A. Hruschka. *Review of Scientific Instruments*, v. 28, Dec. 1957, p. 1058-1059.

Use of "armored" O-ring seals. A simple high-pressure pump piston seal. A proprietary surface treatment to reduce liability of galling of steel parts.

5571 The Plastic Bending of Heavily Curved Beams. W. Johnson and B. W. Senior. *Royal Aeronautical Society, Journal*, v. 61, Dec. 1957, p. 824-830.

When heavily curved circular beams of constant cross section are subjected to a compressive load along the "open" diameter, the load for the start of significant deformation as indicated by the reduction in diameter along the line of action of the load, may be estimated by the use of rectangular plastic stress blocks based on the yield stress of the material.

5572 Elastic Deformation and the Laws of Friction. J. F. Archard. *Royal Society, Proceedings*, v. 243, ser. A, Dec. 24, 1957, p. 190-205.

This paper examines whether the hypothesis of elastic deformation of surface protuberances is consistent with Amonton's law, that the friction is proportional to the applied load.

5573 Symposium on Full-Scale Tests on House Structures, 1956. 60 p. 1957. American Society for Testing Materials, Philadelphia. (TA410 Am35sf)

Rigidity and strength of house built of plywood stressed-cover panels. Facilities for evaluating prefabricated buildings. Full-scale testing of prefabricated military buildings and of precast multi-story flat construction. Structural test of a house under simulated wind and snow loads.

5574 Symposium on Structural Sandwich Constructions. 103 p. 1957. American Society for Testing Materials, Philadelphia. (TA492.S25 Am35s)

Papers deal with testing of materials, particularly at high temperatures, and application of sandwich construction and adhesive bonds, including metal-to-metal and metal-to-resin adhesion.

5575 Thermal Shock and Fatigue. A Literature Survey. Harry Majors, Jr. 56 p. 1957. Bureau of Engineering Research, University of Alabama. (TA405 M28t)

Comparison of brittle with ductile materials. Analysis of thermal shock parameters. Ductile material under thermal shock. Current studies on thermal cycling.

5576 Fatigue Behavior of Aircraft Structural Beams. W. S. Hyler, H. G. Popp, D. N. Gideon, S. A. Gordon, and H. J. Grover. *U. S. National Advisory Committee for Aeronautics, Technical Note* 4137, Jan. 1958, 60 p. (TL570 Un3t)

Fatigue and related static tests were made on Al alloy box beams and I-beams and also on elements simulating kev failure locations in the two beams. The study indicates that the simulation approach will be useful for those cases where it is possible to assess reasonably factors contributing to stress-raisers in the structure.

5577* Roots Pumps. Design and Performance Features. R. Thees. *Vacuum (Annual Issue)*, v. 5, Oct. 1955, p. 25-34.

The limitations of the Roots principle are essentially its restricted compressibility and the generation of heat in the compression stage; the proper range of the Roots pump lies between 10^{-3} and 20 mm. Hg.

5578* (English.) **On a Problem of Heat Conduction With Time-Dependent Boundary Conditions.** Tse-Sun Chow. *Zeitschrift für Angewandte Mathematik und Physik*, v. 8, no. 6, Nov. 1957, p. 478-484.

Determination of the distribution of temperature in a homogeneous, isotropic cylinder when its initial temperature distribution is known and its boundaries are subjected to temperature fields which are arbitrary functions of time.

See also: **4786** (failures of concrete structures); **5231** (speed control in industry); **5237** (motorized hydraulic actuators); **5343** (electromechanical transducers); **5540** (generation of a high vacuum).

METALLURGY

5579 (English.) **The Manufacture of Large High-Pressure Hollow Bodies.** *Aciers Fins & Spéciaux Français*, 1957, no. 27, Dec., p. 82-86.

Manufacturing processes for heavy high-pressure shells. Types of steel; forging operations; heat-treatment.

5580* Molybdenum for High Strength at High Temperatures. *Alloy Metals Review*, v. 8, Dec. 1957, 7 p.

Effect of composition and processing on properties of Mo-base alloys; protective coating; fabrication and joining; applications in the jet propulsion field.

5581* (German.) Suitability of Aluminum Alloys as Electrode Materials. **Die Eignung von Aluminiumlegierungen als Elektrodenwerkstoff.** H. Grefkes. *Aluminium*, v. 33, no. 12, Dec. 1957, p. 802-803.

A new field of Al application, previously satisfied by Cu alloys alone: in the electric upsetting of steel die forging parts, Al electrodes have recently given excellent results. Copper electrodes often cause red shortness in finished steel parts.

5582 Ti-7Al-3Mo Alloy Stays Strong at High Heat. F. A. Crossley. *Iron Age*, v. 181, Jan. 16, 1958, p. 76-78.

Alloy shows up well in tests to check its high-temperature strength and stability. Heat treatment is most important.

5583* (Hungarian.) Production Defects in "Alpaca" Alloys Caused by Phosphorus Contamination. **Foszforszennyezés okozta gyártási hiba alpakka ötvözetekben.** Zoltán Hegedüs and Mihály Stefán. *Kohászati Lapok*, v. 12, no. 10, Oct. 1957, p. 470-472.

Behavior of phosphides at room temperature. Effect of Cu distribution on expansion. Phosphides in the α-phase during homogenization. Local hardness increase in the cooling process. Phosphorus elimination by reduction.

5584 Niobium. I. Occurrence, Extraction and Refining. J. H. Rendall. *Metal Treatment and Drop Forging*, v. 24, Dec. 1957, p. 491-494.

(To be concluded.)

5585 Production Problems of Titanium and Its Alloys. E. Swainson and R. L. P. Berry. *North Atlantic Treaty Organization, Advisory Group for Aeronautical Research and Development Report* 95, Apr.-May 1957, 29 p. (TL565 Ag11r Vis.)

The present state of knowledge in Ti technology, and the possible pattern of future developments.

5586 Titanium Fabrication. L. P. Spalding. *North Atlantic Treaty Organization, Advisory Group for Aeronautical Research and Development Report* 96, Apr. 1957, 34 p. (TL565 Ag11r Vis.)

Problems encountered and their solution in the manufacture of some 2000 airplanes incorporating about a million lbs. of Ti in their design. Primary emphasis is given to Ti alloy sheet applications. Operations are discussed with respect to process limitations and comparisons between Ti and other metals.

5587* The Metallurgy of Beryllium. Its Nuclear Applications. L. R. Williams and P. B. Eyre. *Nuclear Engineering*, v. 3, Jan. 1958, p. 9-18.

Chemical and metallurgical problems associated with production and fabrication; details of the properties to be expected of the finished components.

5588* (German.) Material Testing Problems in the Welding Industry. **Zum Problem der Materialprüfung in der Schweisstechnik.** M. Pfender. *Schweisstechnik*, v. 11, no. 11, Nov. 1957, p. 121-136.

Problems in determining composition, structure, and strength of welded structural steels. Nondestructive testing methods.

5589 A New Steel for Hot Airplanes and Missiles. M. E. Carruthers. *Steel Processing and Conversion*, v. 44, Jan. 1958, p. 19 + 6 pages.

Commercial PH 15-7 Mo stainless steel is competitive "weight for weight" with the best of the high-temperature Ti alloys now available in sheet form. It is readily available in the thin precision-rolled sheets needed and is the easiest of all the high-strength materials to fabricate.

5590 Symposium on Titanium. 208 p. 1957. American Society for Testing Materials, Philadelphia. (TA480.T6 Am35s)

Papers on testing techniques and effects of various heat treatments on the properties and characteristics of Ti and Ti alloys.

5591* (Spanish.) Remarks on the Nature and Making of Quality Steel. **Notas sobre la naturaleza y fabricacion del acero fino. I-II.** Ricardo Guevara Lizaur. *Tecnica Metalurgica*, v. 13, no. 111, May-June 1957, p. 110-135; no. 112, July-Aug. 1957, p. 168-185.

Comparison with alloy steel. Resistance to brittle fracture. Tenacity requirements and the effects of inclusions, sand, and segregations. Influence of S. Modifications in the normal solidification process. Vacuum treatment. Elimination of H and other impurities. Use of fusible metallic electrodes. Continuous casting. Centrifugal casting.

5592* Thorium. John R. Keeler. Paper from "Engineering Materials Handbook". Sec. 13, p. 42-48. 1958. McGraw-Hill, New York. (TA403 M31e Ref.)

Data on Th as an engineering material is given with reference to reduction, melting and fabrication, properties, joining, machining, corrosion, alloys, and health hazards.

5593* Unclassified U. S. Atomic Energy Commission Reports on the Metallurgy of Zirconium and Hafnium. Richard J. Smith, compiler. TID-3508. 37 p. 1957. Available from the Office of Technical Services, Dept. of Commerce, Washington, D. C. (ZQD181.Z7 Un3.1u Ref.)

Annotated references to 134 reports covering physical and chemical properties, phase diagrams, fabrication, testing equipment and methods, and corrosion of Zr, Hf, and their alloys.

5594 Applications, Properties, and Fabrication of Thermenol Type Alloys. J. F. Nachman and W. J. Buehler. *U. S. Department of Commerce, Office of Technical Services*, PB 121098, May 1956, 47 p. (T21 Un3r Contin.)

Hardness, tensile, stress-rupture, corrosion, oxidation resistance and magnetic properties at room temperature and elevated temperature of Thermenol (Fe-Al-Mo).

5595 Investigation of Mechanical Properties, Corrosion Resistance, and Oxidation Resistance of Thermenol, an Iron-Aluminum-Molybdenum Alloy. *U. S. Department of Commerce, Office of Technical Services*, PB 121837, Oct. 1955, 26 p. (T21 Un3r Contin.)

Thermenol is approximately 82% Fe, 15% Al, and 3% Mo; extremely brittle at room temperature. Its ductility and hardness are unaffected by annealing. Its optimum mechanical properties are those in the temperature range of 1100 to 1200 F.

5596* (German.) Sheet Metals From Metallic Powder. **Walzbleche aus Metallpulver.** Karl Wassmann. *VDI Zeitschrift*, v. 100, no. 1, Jan. 1, 1958, p. 22-23.

Production of a good quality sheet metal from Cu-bearing clippings is described.

5597 Contamination of Zirconium-Uranium by Recycling of Scrap. L. F. Cochrun and J. C. Szurley. *Westinghouse Electric Corporation, Atomic Power Division (U. S. Atomic Energy Commission)*, WAPD-179, Jan. 1957, 15 p. (UF767 Un3.1wa Contin.)

The effect of continued recycling of fuel alloy scrap (6.33 w/o U + Zircaloy-2) on chemical composition and physical properties is reported. Three series of five ingots each were melted, each ingot having 30% scrap from the pervious ingot in its series. Impurity levels, tensile data, hardness, and fabricability are reported.

5598* (Polish.) Production of Molybdenum. Properties and Use. **Wytwarzanie molibdenu, jego własności i zastosowanie.** Stanislaw Stolarz. *Wiadomości Hutnicze*, v. 13, no. 11, Nov. 1957, p. 331-336.

Production and reduction of MoO_3; physical and chemical properties of Mo; application as an alloy element in castings.

5599* (German.) Development Trends in Titanium Metallurgy. **Entwicklungslinien der Titan-Metallurgie.** Helmut Winterhager. *Zeitschrift für Erzbergbau und Metallhüttenwesen*, v. 10, no. 12, Dec. 1957, p. 585-592.

Raw materials for the production of Ti. Processing Ti ores to ferrotitanium and Ti metal under special considerations of economic feasibility.

See also: **4661** (Al in aircraft structure); **5479** (letterpress and Mg); **5821** (electron microscopy in ferrous metallurgy); **5904** (boron steel for reactor control rods).

METALS—CORROSION

5600* (Russian.) Aluminum-Calcium and Zinc-Calcium Protectors. **Aliumokal'tsievye i tsinkokal'tsievye protektory.** I. N. Frantsevich, A. F. Zhurakhovskii, and E. L. Pechentkovskii. *Akademiia Nauk Ukrains'koi RSR, Dopovidi*, 1957, no. 6, p. 575-579.

Magnesium and Al-Zn-Ca protectors functioned actively throughout the duration of the test and secured complete protection from corrosion in sea water. Aluminum-Zn-Ca protectors are recommended.

5601 The Corrosion of Monel and 70-30 Cupronickel in Hydrofluoric Acid. Walter J. Braun, Frederick W. Fink, and G. Lee Ericson. *Battelle Memorial Institute (U. S. Atomic Energy Commission)*, BMI-1237, Dec. 1957, 18 p. (UF767 U3b Contin.)

Monel is suitable for the handling of 10 to 70% HF acid at 140 F and for handling 38 and 48% acid at boiling. Elimination of O is necessary to achieve maximum corrosion resistance.

5602 The Oxidation of Molybdenum. E. S. Jones, J. F. Mosher, Rudolph Speiser, and J. W. Spretnak. *Corrosion*, v. 14, Jan. 1958, p. 20-26.

Oxidation of Mo in the temperature range 900 to 1800 F was studied. Three oxide phases were observed to exist on the surface of specimens. The outer oxide is MoO_3; the inner layers of oxide have a composition very close to MoO_2, but do not exhibit an X-ray pattern corresponding to MoO_2.

5603 Compilation and Correlation of High Temperature Catalytic Reformer Corrosion Data. G. Sorell. *Corrosion*, v. 14, Jan. 1958, p. 33-44.

Corrosion is attributed to small quantities of H_2S present in the hot H-rich gas mixtures. Principal variables affecting rate of attack are temperature and H_2S concentration.

5604 Fuel Ash Attack on Aluminum Coated Stainless Steel. J. E. Srawley. *Corrosion*, v. 14, Jan. 1958, p. 54-56.

Coated specimens showed no better resistance than the uncoated steel, nor did prior heat-treatment of the coated specimens have an appreciable effect.

5605 Cavity Formation in Iron Oxide. D. W. Juenker, R. A. Meussner, and C. E. Birchenall. *Corrosion*, v. 14, Jan. 1958, p. 57-64.

Evidence indicates that Fe is transported to its surrounding scale with little or no body diffusion path; the mechanism involved is not identified.

5606* (French.) A Contribution to the Determination of the Qualities of Cast Iron That Should Resist Corrosion at Different Temperatures. **Contribution a la détermination des qualités de fonte devant résister a la corrosion a différentes températures.** P. Detrez. *Corrosion et Anticorrosion*, v. 5, no. 12, Dec. 1957, p. 374-382.

Principal characteristics and composition of the castings. Advantages of castings with a low P content within certain limits. Amount of Si desirable according to casting thickness.

5607* (French.) A Study of the Intercrystalline Corrosion of Stainless 18-8 Steel by Examination of the Internal Friction. **Étude de la corrosion intercristalline de l'acier inoxydale 18-8 par observation du frottement intérieur.** M. Smialowski and W. Drozd. *Corrosion et Anticorrosion*, v. 5, no. 12, Dec. 1957, p. 394-397.

The internal friction method was applied to the study of the initial stage of corrosion, using boiling HNO_3. Effects of corrosion observed after 20 to 30 hr., were intensified after 60 hr.

5608* Corrosion Prevention at the Stern Areas of H. M. Ships. J. C. Kingcome. *Corrosion Prevention and Control*, v. 4, Dec. 1957, p. 35-40.

The measures at present adopted, reinforced epoxy resin coatings for propeller shafts and neoprene for rudders and stern brackets, are in general satisfactory, but in view of the severity of the conditions, there is probably no single remendy.

5609* Spray Packaging and Marine Corrosion. *Corrosion Prevention and Control*, v. 4, Dec. 1957, p. 41-43.

Two main processes for the protection of equipment at sea or when a vessel is being laid up are the "Cocoon" and "Koon-Kover" processes. The Cocoon system consists of a plastic film sprayed direct by spray gun on to the equipment, while Koon-Kovers are designed as loose covers to protect an object, usually while a ship is actually at sea or in harbor.

5610* Experiences With Filming Amines in Finland. Paavo Kajanne. *Corrosion Prevention and Control*, v. 4, Dec. 1957, p. 49-53.

Oxygen and CO_2 are the primary causes of corrosion in boilers and heat transmission equipment. Oxygen can effectively be removed by means of de-gassing apparatus. Combined CO_2 is liberated only at boiler temperature, and is neutralized by ammonia, but this is corrosive to Cu alloy fittings. Film forming amines do not neutralize CO_2 but form a protective film on the metallic surface, at the same time loosening any corrosion products already in existence.

5611 Underground Corrosion. I. Corrosion Mechanism of Metals in Soil. *Corrosion Technology*, v. 5, Jan. 1958, p. 5-9.

Effect of soils free of stray currents on commonly used pipe materials.

5612 The Action of Lead Pigments and Lead Soaps on Aluminum. M. J. Pryor, R. J. Hogan, and F. B. Patten. *Electrochemical Society, Journal*, v. 105, Jan. 1958, p. 9-17.

Aqueous extracts from metallic Pb and litharge are corrosive to Al due to their initially high *p*H and to the galvanic corrosion resulting from Pb deposition on the Al. Aqueous extracts from red lead and basic lead carbonate have lower *p*H, do not deposit metallic Pb on Al, and are much less corrosive.

5613* (Russian.) Brass Corrosion in Alkaline Medium. **Korroziia latuni v shchelochnoi srede.** L. S. Zhuravlev and D. Ia. Kagan. *Elektricheskie Stantsii*, v. 28, no. 12, Dec. 1957, p. 26-28.

Effect of water alkalinity on corrosion of brass; establishment of conditions for corrosion prevention in heat exchangers; corrosion velocity in various media; dependence of brass corrosion on NaOH concentration in the presence and absence of O; relationship between Cu and Zn in the corrosion products.

5614* (Italian.) Research on the Oxidation of Metals and Alloys in the Melted State. **Ricerche sulla ossidazione dei metalli e dell leghe allo stato fuso. VI.** The Cadmium-Tin System. **II sistema cadmio-stagno. VII.** Zinc. **Zinco.** Paolo Spinedi. *Gazzetta Chimica Italiana*, v. 87, no. 12, Dec. 1957, p. 1420-1439.

A thermal and gravimetric method with continuous recording was used to study the oxidation of binary Cd-Sn alloys at temperatures much above melting point. The behavior of Zn was examined from 25 to 800 C.

5615 Corrosion of Aluminum by Alkaline Sequestering Solutions. H. W. McCune. *Industrial and Engineering Chemistry*, v. 50, Jan. 1958, p. 67-70.

Effects on corrosion by triphosphate of time, concentration, pH, buffers, temperature, volume, and complexable cations.

5616 Anodic Polarization as a Possible Rapid Method of Deciding Whether a Given Solution is Corrosive or Inhibitive. P. Hancock and J. E. O. Mayne. *Journal of Applied Chemistry*, v. 7, Dec. 1957, p. 700-708.

Anodic polarization curves were obtained with 12 systems of mixed corrosive and inhibitive ions; behavior of the solution could be estimated from the nature of the polarization curves, with only one exception ($NaNO_2$ + NaCl).

5617 A Copper Ion Displacement Test for Screening Corrosion Inhibitors. William B. Hughes. *Journal of Petroleum Technology*, v. 10, Jan. 1958, p. 54-56.

Method involves evaluation of surface passivity by means of Cu ion displacement after the metal surface has been subjected to a corrosive atmosphere.

5618* (Italian.) Inhibitors of Al Corrosion. **Su alcuni inibitori della corrosione dell'alluminio. II.** Effect of Tannic Acid on 99.0% Al in 1 *N* HCl. **Azione dell'acido tannico sull' alluminio a 99% in acido cloridrico 1 *N*.** G. De Angelis and V. Carunchio. *Metallurgia Italiana*, v. 49, no. 11, Nov. 1957, p. 783-792.

The dissolution of Al in 1 *N* HCl of an electrochemical nature. Tannic acid inhibits the corrosion of 99.0% Al by acting on both anodic and cathodic polarization, shifting the reaction potential towards more anodic values.

5619 The Protection of Metals With Tannins. E. Knowles and T. White. *Oil & Colour Chemists' Association, Journal*, v. 41, Jan. 1958, p. 10-23.

Tannin extracts have recently been found to be of value in protecting ferrous metals from both atmospheric and underground corrosion. Used as wash-primers before painting, solutions of tannin extracts lay down an insoluble weather-resistant

ferric tannate on a ferrous metal surface. In the field of underground metal corrosion, tannins are of particular value in exhibiting a bacteriostatic effect against *Vibrio desulphuricans*.

5620* Corrosion, Cathodic Protection and Common Sense. B. Husock. *Pipe Line News*, v. 30, Jan. 1958, p. 49-52.

Underground corrosion prevention methods.

5621 (German.) Cavitation and Impingement of Drops. **Kavitation und Tropfenschlag.** A. Keller. *Schweizer Archiv für Angewandte Wissenschaft und Technik*, v. 23, no. 11, Nov. 1957, p. 346-361.

Determining and limiting some types of cavitation in hydraulic turbines, pumps, and propellers. Testing cavitation effects on different materials. Drop impingement. Three groups of materials according to their resistance to cavitation as function of hardness. Surface coatings.

5622* (German.) Electrochemical Investigations of Unalloyed Titanium and TiMo3O Alloy. **Elektrochemische Untersuchungen an unlegiertem Titan und der Legierung Ti Mo3O.** O. Rüdiger and R. W. Fischer. *Technische Mitteilungen Krupp*, v. 15, no. 7, Dec. 1957, p. 194-202.

Attack of unalloyed Ti in the active state with development of H. Passivation by anodic oxidation in HF.

5623 Corrosion Resistance of Nickel Alloys in Molten Sodium Hydroxide. H. B. Probst, C. E. May, and Howard T. McHenry. *U. S. National Advisory Committee for Aeronautics, Technical Note* 4157, Jan. 1958, 26 p. (TL570 Un3t)

The corrosion resistance of 11 noncommercial solid-solution alloys and two-phase materials at 1500 and 1700 F was compared with the excellent corrosion-resistant properties of pure Ni. The resistance of the Ni + 30% Cu alloy was comparable to that of pure Ni.

5624* (Serbian.) Corrosion of Structural Al and Measures for Its Prevention. **Korozione pojave na aluminijumu za gradevinski potrebe i njibhovo sprečavanje.** Fran Podbreznik. *Zaštita Materijala*, v. 5, no. 11, Nov. 1957, p. 389-394.

5625* (Russian.) Studies in the Corrosion Resistance of Solid Metallic Solutions. **Issledovanie korrozionnoi stoikosti tverdykh rastvorov metallov. IV.** Ag-Cd System. **Sistema Ag-Cd.** N. N. Gratsianskii and P. F. Kaliuzhnaia. *Zhurnal Fizicheskoi Khimii*, v. 31, no. 11, Nov. 1957, p. 2458-2463.

The corrosion resistance of Ag-Cd alloys was studied by determining the loss in weight in 5% HCl and 3% NaCl solutions at room temperature.

5626* (Russian.) Stability of Titanium and Niobium Borides and Their Alloys Against Oxidation. **Issledovanie stoikosti splavov boridov titana i niobiia protiv okisleniia.** V. S. Neshpor and G. V. Samsonov. *Zhurnal Prikladnoi Khimii*, v. 30, no. 11, Nov. 1957, p. 1584-1588.

Oxidation characteristics of pure NbB_2 and TiB_2 and eight intermediate alloys. The oxidation constants of pure NbB_2 and TiB_2 were found to be $12.9 \cdot 10^{-9}$ and $2.0 \cdot 10^{-9}$ g/cm² per min., respectively.

5627* (Russian.) Oxidation of Alloys Containing Metallic Compound NiAl. **Issledovanie okisleniia splavov, soderzhashchikh metallicheskoe soedinenie NiAl.** E. I. Mozzhukhin, L. Kh. Pivovarov, and Ia. S. Umanskii. *Zhurnal Prikladnoi Khimii*, v. 30, no. 11, Nov. 1957, p. 1593-1599.

Heat-resisting qualities of the single-phase alloys composed of the NiAl only, and of the two-phase alloy NiAl + Ni_3Al. Oxidation of NiAl depends on composition; an excess of Al atoms produced a denser oxide film.

5628* (Russian.) Corrosion Mechanism of the Metals in Fused Chlorides. **Mekhanizm korrozii metallov v rasplavlennykh khloridakh.** N. D. Tomashov and N. I. Tugarinov. *Zhurnal Prikladnoi Khimii*, v. 30, no. 11, Nov. 1957, p. 1619-1625.

A scheme of metal corrosion in fused salts could be represented in the following way; anodic process: discharge of metal ions into melt under the effect of salt anions, flowing of electrons from anode region to the cathode region, and the cathodic process: assimilation of electrons by depolarizer (O_2, H_2O, CO_2, Ca^{++} and others).

5629* (Russian.) Investigation of the Zinc, Iron, Aluminum, and Magnesium Corrosion in Aqueous-Dioxane Solutions of Certain Electrolytes. **Issledovanie Korrozii tsinka, zheleza, aluminiia i magniia v vodno-dioksanovykh rastvorakh nekotorykh elektrolitov.** Iu. B. Kletenik. *Zhurnal Prikladnoi Khimii*, v. 30, no. 11, Nov. 1957, p. 1626-1632.

Studied corrosion in the following solutions: H_2SO_4, HCl, acetic acid aqueous-dioxane solutions, and in aqueous-dioxane solutions of chlorides.

See also: **5205** (rust prevention); **5418** (corrosion and enzymes in canned stone fruit); **5494** (steam boiler corrosion control).

METALS—EXTRACTION AND REFINING

5630 Arc Melting of Zirconium Metal. Richard J. Dunworth. *Argonne National Laboratory (U. S. Atomic Energy Commission)*, ANL-5519, Oct. 1957, 32 p. (UF767 Un3.1an Contin.)

Castings ranging in diameter from 1 to 6-in. and ranging in weight from 0.1-lb. buttons to 130-lb. forging ingots are studied.

5631* (German.) Gases in Steel and Iron Alloys. **Gase in Stahl und Eisenlegierungen.** H. Feichtinger, J. Gremminger, H. Bächtold, and D. Manderson. *Berg- und Hüttenmännische Monatshefte der Montanistischen Hochschule in Leoben*, v. 102, no. 10, Oct. 1957, p. 257-271.

Experimental evidence shows how easily some of the gas, often rapidly absorbed by molten metal, can be subsequently released, and how stable some of it may remain in combination with the metal. Details of a vacuum sampling mold and of equipment for separating non-metallic inclusions on a continuous routine basis.

5632* (German.) New Findings in the Process of Deoxidation. **Erkenntnisse über den Ablauf von Desoxydationsvorgängen.** Erwin Plockinger. *Berg- und Hüttenmännische Monatshefte der Montanistischen Hochschule in Leoben*, v. 102, no. 11, Nov. 1957, p. 277-283.

Shows how steel deoxidation can be influenced by physical values. The working properties of the metal depend not only upon the amount of slag, but also upon the type of oxides and their plastic behavior.

5633* Bibliography on Extractive Metallurgy of Nickel and Cobalt, January 1929-July 1955. R. B. Bauder. 159 p. 1957. U. S. Bureau of Mines, Washington, D. C. (ZTN758 Un3.5b Ref.)

Covers general metallurgy, pyro treatments, hydrometallurgy, electrometallurgy, and miscellaneous recovery methods.

5634 Techniques and Problems in Vacuum Melting. Edward A. Loria. *Blast Furnace and Steel Plant*, v. 46, Jan. 1958, p. 73-78.

5635 Atomic-Age Metal Extraction. L. W. Coffer. *Chemical Engineering*, v. 65, Jan. 1958, p. 107-122.

Points out important advances and classifies the newer processes from the standpoint of the chemistry and metallurgy involved. Describes ion exchange, solvent extraction, and pressure techniques as revolutionizing the acid and alkali leach treatments. Discusses application of various methods in extraction of Nb, Zr, U, Ti, Hf, Mn, V, Co, Ta, Th, Ni, Zn, and Au.

5636* (Czech.) Vacuum Desulphurizing of Pig Iron. **Odsíření surového železa ve vakuu.** A. M. Samarin and Ivan Kašik. *Hutnické Listy*, v. 12, no. 11, Nov. 1957, p. 970-974.

Factors and conditions affecting the desulphurization process. Design and description of the experimental vacuum furnace; development of experimental methods and analysis of results.

5637* (Czech.) Measurements of Relative Mobility of Cations in Three-Component Molten Silicates. **Měření poměrné pohyblivosti kationtů v třísložkových silikátových taveninách.** V. I. Malkin. *Hutnické Listy*, v. 12, no. 11, Nov. 1957, p. 985-989.

Results of measurements to survey metallurgical reaction kinetics in which melted slag participates.

5638* (Czech.) Methods of Continuous Steel Casting in the U.S.S.R. **Způsoby plynulého lití oceli v SSSR.** František Jansch. *Hutnické Listy*, v. 12, no. 11, Nov. 1957, p. 1033-1039.

Statistical data on state and prospects of continuous steel casting in and out of the USSR. Its development and extension in USSR. Indications of how to make the best use of the Soviet experiences.

5639* (Polish.) Calculation of Fuel Combustion and Intake Air Consumption in the Open-Hearth Process. **Obliczanie ilości spalin i zassanego powietrza w procesie martenowskim.** J. Szargut and J. Machniewicz. *Hutnik*, v. 24, no. 10, Oct. 1957, p. 391-397.

Proportions of C, H, O, N in the open-hearth process. Correct composition of combustion air. Effect of the forcing out of the flame on the calculation of the quantity of combustion air. Outlet losses. Examples.

5640 Simple Method for Semi-Continuous Casting of Bronze. II. E. C. Ellwood, J. C. Prytherch, and E. F. Phelps. *Industrial Heating*, v. 24, Dec. 1957, p. 2532 + 2 pages.

Properties of continuously cast rod.

5641 New Process Reduces Iron Ores With Carbon Monoxide. P. M. Unterweiser. *Iron Age*, v. 181, Jan. 30, 1958, p. 93-95.

Direct reduction process that goes a step beyond direct reduction, ends up with a highly useful iron carbide. Checked out on a pilot plant basis, it lends itself to continuous operation.

5642 The Study of Slag-Metal Mixing Efficiency by Models. C. E. A. Shanahan and F. Cooke. *Journal of Applied Chemistry*, v. 7, Dec. 1957, p. 645-654.

The relative efficiencies of various methods of mixing liquid slag and metal were studied by means of cold models. Using Na amalgam as metal and dilute H_2SO_4 as "slag" it was shown that a most efficient method of mixing consists of pouring the metal into the slag and that the degree of mixing is dependent on both the drop height and the rate of pouring.

5643* (Russian.) Quality of Chrome Steel Smelted in a 380-Ton Open-Hearth Furnace. **Kachestvo khromistoi stali vyplavlennoi v 380-t martenovskikh pechakh.** B. G. Petukhov. *Metallurg*, v. 2, no. 12, Dec. 1957, p. 15-17.

Qualitative evaluation of metal smelted in 380-ton furnace. Comparison with metal smelted in 190-ton furnace. Qualitative characteristics of melting, and data on gas content and nonmetallic inclusions in chrome steel are cited in tables.

5644 The Deposition of Metals Other Than Those of the Titanium Group by the Hot Filament Technique. R. A. J. Shelton. *Metallurgia*, v. 56, no. 338, Dec. 1957, p. 283-289.

Investigates V, Nb, Ta, Cr, W, Mo, Re, Fe, Os, Pt, Cu, Be, and U prepared by this method. Only V and Be are of present interest.

5645* (Italian.) Contribution to the Industrial Purification of Zinc Through Zone Melting. **Contributo alla purificazione industriale dello zinco mediante fusione a zone.** G. Scacciati and P. Gondi. *Metallurgia Italiana*, v. 49, no. 11, Nov. 1957, p. 774-782.

Study limited to the purification from Pb. Theoretical limits of purification. Investigation on about 100 kg. of metal covering, work conditions, practical limits, and power consumption for industrial application of the process.

5646 Oxygen Rejuvenates the Converter Process. E. C. Wright. *Metal Progress*, v. 73, Jan. 1958, p. 65-71.

Development of the Linz-Donawitz process of blowing impurities out of pig iron with a stream of pure O striking the top of the bath. Its application in America.

5647 Continuous Casting of Gray Iron. Adalbert Wittmoser. *Metal Progress*, v. 73, Jan. 1958, p. 83-87.

Rounds and tubes of gray iron are cast in a collar mold and withdrawn downward in tempo with the pouring rate.

5648* (French.) Preparation of Zirconium-Zinc Alloys by Metallothermic Reduction in Bombs. **Contribution à l'étude de la préparation d'alliages zirconium-zinc par réduction métallothermique en bombe.** Claude Decroly and Denis Tytgat. *Revue de Métallurgie*, v. 54, no. 12, Dec. 1957, p. 910-917.

Techniques used to prepare Zr-Zn alloys of 20-30 wt.% of Zn in closed vessels.

5649* (Russian.) Investigation of the Burden Movement in a Blast Furnace by Means of Radioactive Isotopes. **Izuchenie dvizheniia materialov v domennoi pechi pri pomoshchi radioaktivnykh izotopov.** I. G. Polovchenko. *Stal'*, v. 17, no. 12, Dec. 1957, p. 1057-1068.

Describes a method of measuring the speed of burden movement, level, and distribution pattern of burden materials in the furnace.

5650* (Russian.) Mineralogical Composition of Fluxed Sinters. **O mineralogicheskom sostave ofliusovannykh aglomeratov.** N. G. Moleva and P. S. Kusakin. *Stal'*, v. 17, no. 12, Dec. 1957, p. 1068-1071.

The nature of reactions, occurring in the process of sintering between the main constituents of burden, used for fluxed sinter production, as well as the mineralogical composition of certain fluxed sinters, were determined.

5651* (Russian.) Regulation of Gas Flows by Changing the Length and Cross Section of Tuyeres. **Regulirovanie gazovykh potokov izmeneniem dliny i secheniia furm.** M. K. Ivanov. *Stal'*, v. 17, no. 12, Dec. 1957, p. 1071-1073.

5652* (Russian.) Preparation of Pure Tellurium by Vacuum Distillation. **Poluchenie chistogo tellura metodom vakuumnoi distilliatsii.** M. P. Smirnov and G. A. Bibenina. *Tsvetnye Metally*, v. 30, no. 12, Dec. 1957, p. 17-29.

Design of laboratory distillation installation and of laboratory furnace for remelting. Tables of experimental results and of chemical composition of distillation products.

See also: **4802** (refractory continuous casting spouts); **4803** (open-hearth side walls); **4804** (plasticized mortars); **4806** (wear of blast furnace refractory material); **4945** (reduction of iron oxides); **5436** (use of oxygenated coal gas in open-hearth furnace); **5541** (temperature of molten steel); **5878** (uranium by the deBoer iodide process).

METALS—FINISHING, POLISHING, AND CLEANING

5653 Technical Developments of 1957. Nathaniel Hall. *Metal Finishing*, v. 56, Jan. 1958, p. 40-49.

Surveys the work done in the field of metal cleaning during 1957.

5654* Polishing Aluminium and Its Alloys. Details of a New Chemical Process. W. K. Bates and C. D. Coppard. *Metal Finishing Journal*, v. 4, Jan. 1958, p. 5 + 6 pages.

Phosbrite 159 removes metal selectively from the highspots and without forming definable etch patterns.

5655 Liquid vs. Bar Buffing Compound. E. T. Candee. *Plating*, v. 45, Jan. 1958, p. 35-38.

Liquid buffing compounds have advantages from a production standpoint and can be more economical than bars.

5656 Taking the Guesswork Out of Grinding and Polishing With Abrasive Belts. Warren K. Seward. *Plating*, v. 45, Jan. 1958, p. 39-44.

Belt speed recommendations for grinding and polishing various types of materials. Lubrication of abrasive belts; operating techniques; improving the final finish.

5657 Brighter Prospects for Brass and Copper. Paul H. Margulies. *Products Finishing*, v. 22, Jan. 1958, p. 54-57.

Describes a cleaning process for Cu and brass.

5658 (German.) Contribution to the Problem of Mechanical Descaling of Wire Rod by Shot Blasting. **Zur Frage der mechanischen Entzunderung von Drähten durch Abstrahlen.** Erich Jaenichen, Alfred Duphorn, Hans Krautmacher, and Wilhelm Püngel. *Stahl und Eisen*, v. 77, no. 25, Dec. 12, 1957, p. 1785-1795.

Design and operation of shot blasting plants. Results of large-scale experiments on thickness and structure of the scale, drawplate wear, wire surface, lubrication, technological properties, behavior in hot-dip galvanizing, and the manufacture of wire nails.

5659 Grinding Wheels for Aluminum. Arthur T. Dalton. *Welding Engineer*, v. 43, Feb. 1958, p. 44.

Abrasive forms have been perfected to such a degree that they can be used on Al as cheaply, rapidly, and efficiently as on any other metal.

See also: **5797** (structure of chemical-polished Al surface).

METALS—FOUNDRY PRACTICE

5660* Production of S. G. Iron by the Nickel-Magnesium Process. W. A. Potter. *British Foundryman*, v. 50, pt. 12, Dec. 1957, p. 597-601.

Deals with the production of S. G. iron and attempts to set out some of the problems met by the metallurgist, based on experience with about 3500 treatments of acid cupola and oil-fired crucible melted iron.

5661* An Improved Technique for Determining the Porosity of Cast Specimens. R. W. Ruddle. *British Foundryman*, v. 50, pt. 12, Dec. 1957, p. 605-615.

Apparatus used is described in detail; testing procedure and method of computing results are given.

5662* Effect of Ti, V, W, and Zr on the Sulphurization-Resistant Property of Cast Iron at High Temperatures. Masakazu Shiozawa and Hiroshi Nakai. *Castings Research Laboratory, Report, Waseda University*, 1957, no. 8, p. 13-15.

Small quantities of Ti, V, and especially Zr, greatly increase sulfurization resistance, while W has only a slight effect.

5663* On the Study of Organic Binders for Molding Sand. Jiro Kashima and Hiroshige Suzuki. *Castings Research Laboratory, Report, Waseda University*, 1957, no. 8, p. 33-37.

Cobalt naphthanate is proved as the most powerful drier for quick hardening of core sand. A 1% addition of Co drier shows good results when specimen is hardened at 150 and 200 C.

5664* (Italian.) Metal Pouring, Deadheads, and Risers. **Colate di metallo, materozze e montanti.** Dennis F. O'Connor and Carlo Morgani. *Fonderia*, v. 6, no. 11, Nov. 1957, p. 485-490.

Fundamental rules are given concerning the best tapping temperatures, volume of ingate, fluidity of metal, contact zone between riser and casting, optimum riser size, solidification, and runner requirements.

5665* (Italian.) The Use of Special Castings in Making Diesel Motors. **I'impiego di ghise speciali nella fabbricazione di motori diesel.** Jean Gonin and Gerard de Smet. *Fonderia*, v. 6, no. 11, Nov. 1957, p. 491-493.

Principal qualities expected from a casting for mechanical use. The six fundamental components. Influence of Si on graphitization; Mn content and defects due to S and P. Castings with a high P content were best.

5666* (French.) A Study of the Capacity of Light Alloys for Producing Non-Porous Castings. **Étude de l'aptitude des alliages légers a donner des pièces moulées étanches.** Louis Grand and Henri Garnier. *Fonderie*, 1957, no. 142, Nov., p. 491-498.

Causes of porosity in castings. Difficulties in classifying alloys according to their capacity to produce non-porous castings. Composition of alloys tested. Pressure test. Machining. Radiographic examination. Favorable effects of Si content and refining.

5667* (French.) A Study of Sodium Silicate Hardened Cores. **Étude des noyaux agglomérés au silicate de soude.** Maurice Decrop and Marcel Goguillon. *Fonderie*, 1957, no. 142, Nov., p. 499-515.

Properties of silica sands hardened by the classical oven-drying method. Hardening by means of CO_2. Behavior of sand mixtures when exposed to air or heat.

5668 Application of Quality Control to a Moulding-Sand System. L. A. Deaville. *Foundry Trade Journal*, v. 104, Jan. 9, 1958, p. 33-36.

Report of a two-year investigation to obtain a sand of known and consistent quality, permitting variation of sand properties at will.

5669* (German.) Systematic Tests and Practical Experiences With HC-Coke. **Systematische Versuche und praktische Erfahrungen mit HC-Koks.** Rolf Ziegler. *Giesserei*, v. 44, no. 25, Dec. 5, 1957, p. 729-739.

The nature of high-carbon coke. Melting performance, iron temperature, blast volume required, combustion ratio, melting gains and losses, mechanical properties, wear of cupola lining, and calorific balance.

5670* (German.) Comparison Between the Use of HC-Coke and Normal Foundry Coke in the Cupola. **Vergleich zwischen dem Einsatz von HC-Koks und Normalkoks im Kupolofen.** Alois Dahlmann. *Giesserei*, v. 44, no. 25, Dec. 5, 1957, p. 740-743.

Effect of different grades of coke on the temperature of the iron. Prerequisites for the successful use of HC-coke. Advantages. Consumption of the accompanying elements and patching material.

5671* (German.) Microporosity in Sand and Chill Mold Castings of Magnesium Alloys. **Mikroporosität in Sand- und Kokillenguss aus Magnesiumlegierungen.** Paul Spitaler. *Giesserei*, v. 44, no. 26, Dec. 19, 1957, p. 757-766.

The effect of wall thickness, mold material, and heat content of the alloy cast. Channeling effect. Different type of micro-shrink holes formed in Mg-Al and Mg-Zn-Cr alloys.

5672* (German.) Behavior of a Green Molding Sand During Sudden Heating in Regard to Surface Defects on Castings. **Das Verhalten von grünem Formsand während einer plötzlichen Erhitzung im Hinblick auf das Entstehen von Gussfehlern.** H. G. Levelink. *Giesseri*, v. 45, no. 1, Jan. 2, 1958, p. 1-9.

Effect of the sand type, wet layer, and expansion force. Significance of admixtures of sawdust, pitch, and coal dust.

5673* (German.) Use of a Synthetic-Resin Core Binding Agent in the Steel Foundry. **Über die Verwendung eines Kunstharz-Kernbinders in der Stahlgiesserei.** Emil Lange. *Giesserei*, v. 45, no. 1, Jan. 2, 1958, p. 22-23.

The core making process. Catalyst-controlled binding. Difficulties to be overcome in introducing the process. Examples of application.

5674* (German.) Behavior of an Air-Gas Mixture in a Hollow Core. **Das Verhalten des Luft-Gas-Gemischs im Formhohlraum.** Walter Göschel. *Giessereitechnik*, v. 3, no. 12, Dec. 1957, p. 279-282.

Method for eliminating the impact of suddenly expanding air, trapped in the void of the large core during pouring. Equipment which pumps the gases out of the void, consisting of an "injector" (compressed air-suction equipment) placed in outlet opening.

5675* (German.) Defects of Light Metal Castings. **Interessante Ausschusserscheinungen bei Leichtmetallguss.** Helmut Rogoss. *Giessereitechnik*, v. 3, Nov. 1957, p. 241-244.

Study of the defects, their chemical and physical origin.

5676* (German.) Silicosis and Its Prevention in the Foundry. **Die Silikose und ihre Bekämpfung in Giessereien.** Rudolf Bommert. *Giessereitechnik*, v. 3, Nov. 1957, p. 249-254.

Nature and origin of silicosis, its causes, and quantity found in foundry, as well as the means of combating it were discussed.

5677 (Swedish.) Some Steps in the Development of High Duty Malleable Cast Iron. **Några steg i utvecklingen av högvärdigt aducergods.** Bertil Thyberg. *Gjuteriet*, v. 47, no. 11, Nov. 1957, p. 179-188.

Various ways have been tried both in laboratory and production to develop pearlitic malleable iron, resulting in qualities with an ultimate tensile strength of up to 62-67 kg/mm^2, a yield point 38-42 kg/mm^2, and an elongation 5-8%. "Inverse greyness" and remedies. Hardening of malleable iron and its possibilities.

5678 (Swedish.) The Swelling of Wooden Patterns. **Fuktvariationer-trämodellens fiende nr 1.** Lars Lange. *Gjuteriet*, v. 47, no. 11, Nov. 1957, p. 189-192.

Changes of the dimensions of wooden patterns caused by humidity. Foundry defects. Variations of air humidity according to corresponding moisture content in different parts of the foundry.

5679* A Literature Review of Metal Penetration. A. E. Murton and S. L. Gertsman. *Modern Castings*, v. 33, Jan. 1958, p. 37-42.

5680* Hot Deformation of Molding Sand. Harry W. Dietert and Tom E. Barlow. *Modern Castings*, v. 33, Jan. 1958, p. 43-47.

Describes deformation of sand as it is heated by molten metal.

5681* Gases in Cast Iron With Special Reference to Pickup of Hydrogen in Sand Molds. An Account of Recent Work and the Views of British Investigators. J. V. Dawson and L. W. L. Smith. *Modern Castings*, v. 33, Feb. 1958, p. 39-52.

Pinhole defect and its relation to H pickup. Significance of graphite films. Effect of ferro-silicon, Al, Ti, and Bi in nodular iron. Effect of pouring temperature and of additions to sand.

5682* Observations on Pinhole Defects in White Iron Castings. R. W. Heine. *Modern Castings*, v. 33, Feb. 1958, p. 53-57.

Slag formation during cooling of the molten metal is a major cause of pinhole defects. Such defects are readily promoted by variable conditions of gating, pouring, sand, and molding practices.

5683* Improving Electric Furnace Refractory Life by Special Shell Cooling Techniques. Vernon J. Howard. *Modern Castings*, v. 33, Feb. 1958, p. 68-70.

5684* (Hungarian.) Experiences With the Basic-Lined Cupola. **Üzemi tapasztalatok bázisos kupolókemencével.** Ferenc Varga, Lajos Kálmán, and Rezsó Sima. *Öntöde*, v. 8, nos. 9-10, Sept.-Oct. 1957, p. 204-207.

There was a 22% decrease in S content in the melt of a basic-lined cupola. More decrease can be expected with hot blast. As much as 0.1% must be maintained in ingot molds in steel works.

5685 Heat Control in the Die Casting Process. A. F. Bauer. *Precision Metal Molding*, v. 16, Jan. 1958, p. 46 + 3 pages.

Methods of controlling temperature of molten metal, shot sleeve and plunger, nozzles, and dies.

5686 Updating the Hi-Temperature Story on Gray Iron Castings. Charles F. Walton, Franz R. Brotzen, and John F. Wallace. *Product Engineering*, v. 29, Jan. 20, 1958, p. 52-57.

Mechanical properties, modulus of elasticity, compressive strength, hardness, and wear resistance are considered.

5687* (Polish.) The Principles of Pattern Plate Design for Shell Molding. **Zasady konstruowania płyt modelowych do formowania skorupowego.** Henryk Rapacki. *Przeglad Odlewnictwa*, v. 7, no. 11, Nov. 1957, p. 309-317.

Working conditions of pattern plates and requirements for various materials used. Choice of metal depending on the amount of mechanization of the molding process and on the intricacy of the pattern. Iron and Al alloys. Design; adequate thermal capacity; resistance to distortion; casting draft.

5688* (Polish.) Volume of Gas Evolution From Core Sands and Binders. **O wydzielalności gazów z mas oraz spoiw rdzeniowych.** Jerzy Ornst. *Przeglad Odlewnictwa*, v. 7, no. 11, Nov. 1957, p. 317-326.

Tests showed a linear relation between binder content in the mix and gas content in the sand. Classification of binders used according to specific volume of gas evolution and to strength properties. Critical volume and critical permeability.

5689* (Polish.) Silumin Plasticity Problem. **Zagadnienie plastyczności siluminu.** Aleksander Krupkowski and Czesław Adamski. *Przeglad Odlewnictwa*, v. 7, no. 12, Dec. 1957, p. 341-347.

Improving Silumin casting with nearly 11% Si. Maximum elongation in tensile test. Effect of pouring temperature, refining with nitrogen, and modification with metallic sodium.

5690* (Polish.) Molding in Chamotte Sands. **Formowanie w masach szamotowych.** Glogier Jerzy. *Przeglad Odlewnictwa*, v. 7, no. 12, Dec. 1957, p. 347-354.

A study of the application of chamotte sands to steel casting. Production of molds and chamotte cores. Casting defects of carobn steel produced in chamotte sands.

5691* (French.) A Contribution to the Rules to Be Applied in Designing Light Alloy Castings. **Contribution aux règles du tracé des pièces coulées en alliages légers. III.** Charles Roinet. *Revue de l'Aluminium*, v. 34, no. 249, Dec. 1957, p. 1233-1239.

Solidification process; feeding the molds. Direction given to casting. Design of patterns. Controlled solidification. Measures to facilitate molding and deburring.

5692* (Czech.) Various Methods of Magnesium Inoculation in the Production of Spheroidal Cast Iron. **O ruzných způsobech očkování hořčíkem při výrobě tvárné litiny.** Konstantin I. Vaščenko. *Slévárenství*, v. 5, no. 11, Nov. 1957, p. 324-329.

Design of inoculation installations and actual methods for inoculation with Mg. The most advantageous method is inoculation with fluid Mg.

5693 The Solidification of Castings. R. W. Ruddle. 2nd Rev. Ed. 406 p. 1957. Institute of Metals, London. (TS233 R83s2)

A critical survey of research on solidification mechanism and rate, and practical application to the production of sound castings.

See also: **5647** (continuous casting of gray iron).

METALS—HEAT TREATMENT

5694* (German.) The Effect of Variable Heat Treatment on the Solidification and the Specific Electric Resistance of Soft, Rimmed Thomas Steel, and of Recarburized Pure Iron During Cold Working, and Chilling or Deformation Aging. **Einfluss unterschiedlicher Wärmebehandlung auf das Verfestigungsverhalten und den spezifischen elektrischen Widerstand von weichem, unberuhigtem Thomasstahl und aufgekohltem Reineisen bei der Kaltverformung und während der Abschreck- oder Verformungsalterung.** Hermann Schenck, Eugen Schmidtmann, and Helmut Brandis. *Archiv für das Eisenhüttenwesen*, v. 28, no. 12, Dec. 1957, p. 761-769.

5695 Applications of Furnace Atmospheres. II. C. E. Peck. *Industrial Heating*, v. 24, Dec. 1957, p. 2486 + 3 pages.

Types of atmospheres employed in hardening treatments for ferrous metals are described. (To be continued.)

5696* (Russian.) Surface Hardening of Titanium by Treatment in Molten Borax. **Poverkhnostnoe uprochenie titana obrabotkoi v rasplavlennoi bure.** A. N. Minkevich and Iu. N. Shul'ga. *Metallovedenie i Obrabotka Metallov*, 1957, no. 12, Dec., p. 53-61.

The most efficient conditions of treatment are 900 to 930 C for 3 hr. with current density at about 0.1 amp./sq. cm.

5697 The Vocabulary of Heat Treatment. G. R. Morton. *Metal Treatment and Drop Forging*, v. 24, Dec. 1957, p. 481-490.

The fundamentals of the heat treatment of steel are explained and the precise meanings of the various terms are defined.

5698* Hardenability of Pearlitic Malleable Iron. R. W. Heine. *Modern Castings*, v. 33, Jan. 1958, p. 48-52.

Report of AFS Pearlitic Malleable Committee (6E) presents end-quench hardenability curve data.

5699* (German.) Comparison Between the Processes of Wire Patenting by Electric Resistance and by Heating in the Gas-Fired Continuous Furnace. **Vergleich der elektrischen Widerstandspatentierung mit der Bleipatentierung nach Erhitzen im gasbeheizten Durchziehofen.** Erich Jaenichen, et al. *Stahl und Eisen*, v. 77, no. 25, Dec. 12, 1957, p. 1802-1817.

Effects of wire heating temperature, lead bath temperature, and heating rate in electric resistance patenting on the properties of steels containing 0.35 to 0.95% C. Testing wires with the spring, twisting, and bending fatigue tests; behavior in aging.

5700* (German.) Dry-Cyaniding of Sintered Iron Parts. **Karbonitrieren von Sintereisenteilen.** Anton Schwarz. *VDI Zeitschrift*, v. 99, no. 36, Dec. 21, 1957, p. 1786-1787.

Case hardening of parts made of pressed and sintered iron powder by annealing in a mixture of hydrocarbon and ammonium hydroxide gases. Microhardness of polished surfaces of specimens of different densities as a function of penetration.

5701* (German.) The Effect of Activation Admixtures of the Fast Carburizer on the Carburization of Steel. **Wirkung von Aktivierungszusätzen in festen Einsatzmitteln zum Aufkohlen von Stählen.** Peter Wincierz. *VDI Zeitschrift*, v. 100, no. 1, Jan. 1, 1958, p. 21-22.

Activation admixtures accelerate the carburization of the alloyed and non-alloyed steels in charcoal. The H content and the dissociation heat of the compound determine the effect of carbonizing stimulus. The N containing activation material gives up its atomic N which by dissolving in Fe accelerates carburization. A N containing stimulant could cause supercarburization of the alloyed steels.

5702* (Polish.) Furnaces for the Heat Treatment of Aluminum Alloys. **Piece do obróbki cieplnej stopów aluminiowych.** Kazimierz Kurski. *Wiadomości Hutnicze*, v. 13, no. 12, Dec. 1957, p. 367-371.

Study of the three basic operations: tempering, saturation, and aging. Description of furnaces with forced air circulation and salt furnaces. Advantages and disadvantages of nitrate bath furnaces.

5703* **Continuous Hardening and Tempering of Steel Strip.** *Wild-Barfield Heat Treatment Journal*, v. 6, Dec. 1957, p. 10-12.

Details of a continuous furnace ideal for flow line production methods of heat-treating steel strip.

See also: **5709** (heat treatment of Ergal); **5833** (hardening of Ti alloys).

METALS—MECHANICAL AND PHYSICAL PROPERTIES

5704 (English.) **Fatigue Fractures and How to Avoid Them.** *Aciers Fins & Spéciaux Français*, 1957, no. 27, Dec., p. 48-57.

Fatigue fractures are often due to imperfections in the form of pieces both on the geometric and microgeometric scale.

5705 (English.) **The Effects of Aging and Straining on the Internal Friction of Hydrogen Charged 1020 Steel at Low Temperatures.** L. C. Weiner and M. Gensamer. *Acta Metallurgica*, v. 5, no. 12, Dec. 1957, p. 692-694.

Aging at room temperature on previous straining of H charged 1020 steel causes an internal friction peak at 105 K to appear, reach a maximum, decrease, and finally disappear. This is expalined by a model which involves the dragging along of H atmospheres by oscillating dislocations. Another peak at 50 K is apparently due to stress-induced diffusion of interstitial H.

5706 (German.) Measurements of Internal Friction on Slightly Strained Iron Carbon Alloys. **Dämpfungsmessungen an schwach gereckten Eisen-Kohlenstoff-Legierungen.** W. Wepner. *Acta Metallurgica*, v. 5, no. 12, Dec. 1957, p. 703-710.

The time dependence of precipitation was investigated in a specimen of pure Fe to which less than 0.02% C was added, with or without previous slight deformation up to 5% strain.

5707 (English.) **The Density of Dislocations in Compressed Copper.** L. M. Clarebrough, M. E. Hargreaves, and G. W. West. *Acta Metallurgica*, v. 5, no. 12, Dec. 1957, p. 738-740.

The changes in stored energy, macroscopic density, and electrical resistivity associated with the annealing of deformed Cu were measured.

5708 (English.) **The Thermodynamic Properties of Silver-Gold Alloys.** J. L. White, R. L. Orr, and R. Hultgren. *Acta Metallurgica*, v. 5, no. 12, Dec. 1957, p. 747-760.

5709* (Italian.) Influence of Heat Treatment on the Fatigue Resistance of Ergal. **Influenza del trattamento termico sulla resistenza a fatica dell' Ergal.** F. Gatto. *Aluminio*, v. 26, no. 11, Nov. 1957, p. 463-467.

In order to identify the causes of the elevated scattering of fatigue resistance, rotative bending tests were carried out with this alloy in its different states of heat treatment. Comparison of fatigue curves gives useful indications concerning the influence of structural properties on the fatigue resistance.

5710* (Italian.) The Influence of Silicon Content and of the Presence of Manganese on the Properties of G-AS 13 UNI 3047. **Influenza del tenore di silicio e della presenza di manganese sulle caratteristiche della lega G-AS 13 UNI 3047.** D. Gualandi. *Alluminio*, v. 26, no. 12, Dec. 1957, p. 525-535.

The alloy containing 12% Si and 0.4% Mn showed the best properties in the group of alloys studied.

5711* (German.) Electrical Conductivity of Aluminum. **Beitrag zur Frage der elektrischen Leitfähigkeit des Aluminiums.** K. R. Vassel. *Aluminium*, v. 33, no. 12, Dec. 1957, p. 781-782.

Effect of the nature and percentage of alloying elements. Possible correlation with the atomic structures of these elements.

5712* (German.) Fatigue Studies on Bonded Aluminum Structural Parts. **Dauerfestigkeitsuntersuchungen an geklebten Aluminium-Bauteilen.** K. F. Hahn and H. D. Steffens. *Aluminium*, v. 33, no. 12, Dec. 1957, p. 783-788.

By interposition of flexible interlayers it was possible to raise the fatigue resistance of joints between Al parts considerably above those of straight bonded or riveted joints.

5713* (German.) The Strength Under Alternating Torsion Stress of Certain Heat-Treatable Steels After Inductive Surface Hardening. **Verdrehwechselfestigkeit einiger Vergütungsstähle nach induktiver Randhärtung.** Franz Bollenrath. *Archiv für das Eisenhüttenwesen*, v. 28, no. 12, Dec. 1957, p. 801-806.

Effect of depth of hardening on torsion fatigue strength.

5714 (German.) The Deviations From the Matthiessen Rule for Lead in Temperature Range From 14 K up to 353 K. **Die Abweichungen von der Matthiessenschen Regel bei Blei im Temperaturbereich von 14° K bis 353° K.** E. Krautz and H. Schultz. *Braunschweigischen Wissenschaftlichen Gesellschaft, Abhandlungen*, v. 8, 1956, p. 55-60. (Q3 B73a Vis.)

The deviations from the Matthiessen rule are measured with In added in different concentrations. The deviation can be described with the two-band theory of conductivity.

5715 (German.) Effect of a Small Addition of Nickel on the Electrical and Mechanical Properties of Bismuth. **Die Beeinflussung der elektrischen und mechanischen Eigenschaften von Wismut durch geringe Nickel-Zusätze.** Hilde Krüger and Günter Lautz. *Braunschweigischen Wissenschaftlichen Gesellschaft, Abhandlungen*, v. 8, 1956, p. 130-141. (Q3 B73a Vis.)

5716 The Effect of Heat Treatment on Low Temperature Internal Friction Maxima. T. S. Hutchison and G. J. Hutton. *Canadian Journal of Physics*, v. 36, Jan. 1958, p. 82-87.

Measurements of the attenuation of sounds at a frequency of 5 Mc. were made over the temperature range 100 to 200 K on polycrystalline high-purity Al subjected to various thermal and mechanical treatments.

5717 Fatigue in Mining and Construction Equipment. B. M. Hamilton. *Canadian Mining and Metallurgical Bulletin*, v. 50, no. 548, Dec. 1957, p. 717-724.

It can be estimated that the fatigue limit or endurance strength of a given part will be approximately 50% of the tensile strength. This value may be used for design purposes. If surface irregularities or discontinuities are present, endurance strength will be lowered. The amount of loss in fatigue strength will be associated with the severity and relative location of the surface irregularity.

5718 The Mechanism of Fatigue: A Review. R. C. A. Thurston. *Canadian Mining and Metallurgical Bulletin*, v. 50, no. 548, Dec. 1957, p. 708-716; *Canadian Institute of Mining and Metallurgy, Transactions*, v. 60, 1957, p. 390-398.

Theories of fatigue; metallographic and X-ray diffraction observations; crack growth.

5719* (Russian.) The Effect of Thin Mercury Coatings on the Strength of Metal Single Crystals. **Vliianie tonkikh rtutnykh pokrytii na prochnost' metallicheskikh monokristallov.** V. N. Rozhanskii, N. V. Pertsov, E. D. Shchukin, and P. A. Rebinder. *Doklady Akademii Nauk SSSR*, v. 116, no. 5, Oct. 11, 1957, p. 769-771 + 1 plate.

Zinc, Sn, Cd, and Pb crystals with 99.99% basic metal, 0.5-in. diameter, and approximately 10 mm. in length were used. The Hg layer was about 0.1μ. Effect of the specific elongation on the real tension for amalgamated and non-amalgamated Zn and Sn single crystals.

5720* (Russian.) The Properties of TiB_2-CrB_2-ZrB_2 Alloys. **Svoistva troinykh splavov diboridev titana, khroma i tsirkeniia.** R. I. Portnei and G. V. Samsonov. *Doklady Akademii Nauk SSSR*, v. 116, no. 6, Oct. 21, 1957, p. 976-978.

The solubility of ZrB_2 in $(Ti,Cr)B_2$ is about 40 mol. %, and of $(Ti,Cr)B_2$ in ZrB_2, less than 10 mol. %. The solubility of ZrB_2 in CrB_2 increases when ZrB_2 is dissolved in the double boride, $(TiCr)B_2$, since the ZrB_2 forms a continuous series of solid solutions with TiB_2. Maximum microhardness and electric resistance were found in samples quenched from 1900 C.

5721 (French.) Electric Properties of Ag_2Se. **Les propriétés électriques du sélénide d'argent Ag_2Se.** G. Busch and P. Junod. *Helvetica Physica Acta*, v. 30, no. 6, 1957, p. 470.

No ionic conductivity can be measured in Ag_2Se, which is a semiconductor up to 133 C. In its superior phase it has a metallic conductivity.

5722 (German.) Oscillatory Magnetic Resistance Variation of *n*-Type InSb at Low Temperatures and High Field Intensities. **Oszillatorische magnetische Widerstandsänderung von *n*-Typ InSb bei tiefen Temperaturen und hohen Feldstärken.** G. Busch, R. Kern, and B. Lüthi. *Helvetica Physica Acta*, v. 30, no. 6, 1957, p. 471-472.

Description of a new method for measuring the resistance variation of a single crystal *n*-type InSb specimen ($n=6.2\cdot10^{18}/cm^3$) in a transversed magnetic field up to 100 k Gauss at 4.2 and 80 K.

5723* (Czech.) Laws Governing the Plastic Deformation of Steel During Repeated Heating-Cooling Cycles and Some Peculiarities of the Microstructure of Metals and Alloys at High Temperatures. **Zákonitosti plastické deformace oceli při opakovaných cyklech ohrevochlazení a některé zvláštnosti mikrostruktury kovů a slitin za vysokých teplot.** M. G. Lozinskij. *Hutnické Listy*, v. 12, no. 11, Nov. 1957, p. 974-985.

Study on pecularities of metal and alloy microstructure at high temperature by means of selective color oxidation. Design and basic circuit diagram if IMAS-5M apparatus permitting direct microscopic observation and photographical and film recording of the microstructure of different materials on simultaneous measuring of the deformation of heated specimens.

5724* (Czech.) Homogeneity of Very Heavy Ingots and Its Effect on Mechanical Properties. **Homogenita velmi těžkých ingotů a její vliv na mechanické hodnoty.** Oldřich Bohuš. *Hutnické Listy*, v. 12, no. 11, Nov. 1957, p. 1039-1045.

Origin, quantity, and composition of inclusions. Liquation and segregation elements in the ingot. Mechanical properties of ingot in its different parts. Important indexes determined on an ingot section of 80 tons made of basic steel. Specifications for the steel production, pouring and solidification of very heavy forging ingots.

5725 (French.) Investigations of the Deformation of Steel by Heat. **Recherches sur la déformation des aciers a chaud. I.** Development of a Hot Torsion Machine Working at Different Speeds. Hot Torsion Test. First Results. **Mise au point d'une machine de torsion à chaud à vitesse variable. Essais de torsion à chaud. Premiers résultats.** *Institut de Recherches de la Sidérurgie Publications*, ser. A, no. 174, Oct. 1957, 88 p. (TN602 In7p Vis.)

A study of the deformation at usual metal working temperatures of steels of different compositions and structures, especially of the relationship between the stress factors, deformation speed, and temperature for different types of stresses.

5726 Internal Friction. Effects of Interstitial and Substitutional Elements. P. M. Robinson and R. Rawlings. *Iron & Steel*, v. 31, Jan. 1958, p. 3-7.

Formal theory of anelasticity; measurement of internal friction; stress-induced ordering of interstitial solid solutions.

5727 The Properties of Some Silicon-Molybdenum Steels. A. S. Kenneford. *Iron and Steel Institute, Journal*, v. 188, Jan. 1958, p. 16-22.

Heat treatment and mechanical properties of a series of steels having Si and Mo as the only alloying elements. These steels are resistant to thermal stress-cracking, and also to softening after tempering at temperatures up to about 550 C. They exhibit good ductility and impact value after tempering to give tensile strengths in the neighborhood of 120 tons/in^2.

5728 Emissivities of Metallic Surfaces at 76° K. M. M. Fulk and M. M. Reynolds. *Journal of Applied Physics*, v. 28, Dec. 1957, p. 1464-1467.

Heat transport by radiation between surfaces at 300 and 76 K was measured. It was found that the emissivity of surfaces was lowest when used without any mechanical working and that the ability to absorb radiant energy varied with the length of time the surface was kept cold.

5729* (Hungarian.) Technology of Production of Ferromagnetic Materials Used for High Voltage Machines. **Erősáramú villamosgépik ferromágneses anyagainak gyártási technológiája. II.** Theoretical Bases. **Elméleti alapok.** Ernó Neuhöffer. *Kohászati Lapok*, v. 12, no. 10, Oct. 1957, p. 455-459.

A theoretical study of the composition of ferromagnetic materials; parameters independent or dependent of the structure and of the crystalline state. Selection of components for transformers and dynamos. Effect of impurities on the ferromagnetic properties of Fe.

5730 A New Standard Hardness Testing Machine. R. S. Marriner and F. C. P. Mason. *Machinery Lloyd (Overseas Ed.)*, v. 30, Jan. 4, 1958, p. 71-75.

Design and performance of a new dead-weight indenting machine using a 136° pyramid indentor and standard loads of 30, 50, 100, and 120 kg.

5731 Micro-Hardness Testing. R. Wall. *Metal Industry*, v. 91, Dec. 20, 1957, p. 521-522.

Experiences and results obtained over five years of using the micro-hardness technique are described. The subject is considered both from the laboratory point of view and as a production quality control method.

5732* (Russian.) Mechanism of the Destruction of E1437 Alloy Under Continuous Use at High Temperature. **Mekhanizm razrusheniia splava El 437 v usloviiakh dlitel'noi raboty pri povyshennykh temperaturakh.** S. T. Kishkin and A. A. Klypin. *Metallovedenie i Obrabotka Metallov*, 1957, no. 12, Dec., p. 36-40.

Shows that formation of cracks at 700 and 800 C under continuous static load occurs along the grain boundaries.

5733* (Russian.) The Effect of Fiber Orientation on the Contact Fatigue Strength of Hardened Steel. **Vliianie orientirovki volokon na kontaktnuiu ustalostnuiu prochnost' zakalennoi stali.** A. S. Shein. *Metallovedenie i Obrabotka Metallov*, 1957, no. 12, Dec., p. 61-66.

Examples prove that transverse orientation of fibers increases steel strength by 20%, and its contact fatigue strength by 3 to 5 times.

5734* (Russian.) The Effect of Thick Anodizing on the Fatigue Strength of AK-4 and VD-17 Aluminum Alloys. **Vliianie glubokogo anodirovaniia na ustalostnuiu prochnost' aliuminievykh splavov AK-4, and VD-17.** A. S. Nikishov, G. V. Kurganov, and N. I. Iarzhemksaia. *Metallovedenie i Obrabotka Metallov*, 1957, no. 12, Dec., p. 66-68.

Study of the effect of anodic films, 70-80μ thick, on fatigue strength of the above alloys at 20 to 200 C.

5735 Elastic Moduli and Tensile Properties of Titanium-Carbon and Titanium-Aluminium-Carbon Alloys. H. Brooks,

G. I. Lewis, and J. I. M. Forsyth. *Metallurgia*, v. 56, no. 338, Dec. 1957, p. 277-282.

The beneficial effect of C additions on the Young's modulus of Ti is confirmed, but the resulting brittleness prohibits use of C as a modulus-raising addition in commercial sheet alloys.

5736* (English.) **Magnetic Properties of Metals.** J. H. Van Vleck. *Nuovo Cimento (Supplemento)*, v. 6, ser. 10, no. 3, 1957, p. 857-886.

Spin paramagnetism of conduction electrons. Diamagnetism of free electrons in Boltzmann statistics, in Fermi-Dirac statistics for weak fields. Saturation corrections. De Haas-van Alphen effect. Pauli reaction.

5737* (English.) **Ferromagnetism.** C. Kittel. *Nuovo Cimento (Supplemento)*, v. 6, ser. 10, no. 3, 1957, p. 895-922.

Saturation magnetization and exchange, domain theory, H.F. properties of ferromagnetics and ferrites.

5738* (English.) **Antiferromagnetism.** C. J. Gorter. *Nuovo Cimento (Supplemento)*, v. 6, ser. 10, no. 3, 1957, p. 923-941.

Molecular field model. Three types of solutions in a orthorhombic crystal. Spin wave model. Hysteresis. Antiferromagnetic resonance with polarization at high temperatures. Proton magnetic resonances.

5739 Radiation Damage Studies Program. ETR Loop Materials Progress Report II. M. S. Robinson. *Phillips Petroleum Co., Idaho Operations Office (U. S. Atomic Energy Commission)*, IDO-16409, Sept. 1957, 33 p. (UF767 Un3.1id Contin.)

Tests on 16-1 Croloy, Hastelloy-X, Inconel-702, Inconel-X (double aged), Inconel-X (single aged), K-Monel, and 410 Stainless Steel are reported.

5740* (English.) **The Measurements of the Galvanomagnetic Tensors of Bismuth.** Toshihiro Okada. *Physical Society of Japan, Journal*, v. 12, no. 12, Dec. 1957, p. 1327-1337.

Pure Bi was investigated at temperatures between -160 and 45 C. Two components of the resistivity tensor, two of the Hall tensor, eight of the magneto-resistance tensor, and six of the third order galvanomagnetic tensor were determined as the functions of temperature.

5741 The Thermal Expansion of Iron Ditelluride. J. P. Llewellyn and T. Smith. *Physical Society, Proceedings*, v. 70, no. 456B, Dec. 1957, p. 1113-1122.

The variation with temperature of the unit cell dimensions of two samples of orthorhombic iron ditelluride $FeTe_{2.00}$ and $FeTe_{2.10}$, was measured between 17 and 550 C using the X-ray powder method. A comparison between the expansion rates of $FeTe_{2.00}$ and $FeSb_2$ lends weight to the proposed existence of additional metalloid-metalloid bonds in the latter compound.

5742* (Russian.) Evaporation of Barium From the Surface of Some Metals. **Isparenie bariia s poverkhnosti nekotorykh metallov.** P. M. Marchuk. *Radiotekhnika i Élektronika*, v. 2, no. 12, Dec. 1957, p. 1479-1490.

Main regularities of the evaporation process of Ba from polycrystalline surface of the carburized or pure metal coated with Re or platinized W were studied.

5743* (French.) Recrystallization of Very High Purity Aluminum and Its Influence on Low-Temperature Electrical Conductivity. **Étude de la recristallisation de l'aluminium de très haute pureté et de son influence sur la conductibilité électrique aux basses températures.** P. Albert, O. Dimitrov, and J. Le Héricy. *Revue de Métallurgie*, v. 54, no. 12, Dec. 1957, p. 931-941.

Aluminum containing less than 10 p.p.m. of impurities, was studied by low-temperature electrical conductivity measurements, and simultaneously, by X-ray diffraction and low-temperature metallography.

5744 A Correlation of the Thermomagnetic and Domain Behaviour of a Single Crystal of Silicon-Iron. L. F. Bates, D. A. Christoffel, H. Clow, and P. F. Davis. *Royal Society, Proceedings*, v. 243, ser. A, Dec. 24, 1957, p. 160-171 + 1 plate.

The thermal changes accompanying the magnetization of a single crystal specimen of silicon-iron along a [001] direction were measured and a Bitter figure study made of the same specimen.

5745 The Mechanical Testing of Thin Mild-Steel Sheet and Strip. M. L. Hughes. *Sheet Metal Industries*, v. 35, no. 369, Jan. 1958, p. 5-18.

Production of cold-reduced tinplate stock and its physical properties; hardness, micro-indentation, and bend tests; tests for stiffness and "springiness"; "bend factor"; variation in sheet springiness; springback; cupping and tensile tests; surface finish.

5746 Variables Affecting the Thermal Stability of Three Titanium Alloys. F. R. Schwartzberg, D. N. Williams, and R. I. Jaffee. Paper from "Symposium on Titanium". American Society for Testing Materials. 1957, p. 3-13. (TA480.T6 Am35s)

The effects of variations in stress, strain, time, and temperature during thermal exposure on the tendency toward thermal instability in Ti-2Mo-2Cr-2Fe, Ti-6Al-4V, and Ti-4Al-4Mn alloys were investigated. None of these alloys, which were vacuum annealed and given a stabilizing heat treatment before exposure, showed evidence of instability over a wide range of exposure conditions.

5747 The Effect of Temperature on the Uniform Elongation of Titanium Alloys. F. C. Holden, H. R. Ogden, and R. I. Jaffee. Paper from "Symposium on Titanium". American Society for Testing Materials. 1957, p. 14-31. (TA480.T6 Am35s)

The limits of uniform elongation were measured for typical α, α-β, and β Ti alloys over a temperature range from -75 to 300 C. Highest uniform elongation was obtained for commercial Ti α, while that for the β-quenched 7.5 Cr and 7.5 Mo alloy was lowest. The dependence on temperature is marked, particularly in the two-phase alloys.

5748 The Effect of Composition and Annealing Treatment on the Thermal Stability of Chromium-Molybdenum Alloys of Titanium. H. R. Ogden, F. C. Holden, and R. I. Jaffee. Paper from "Symposium on Titanium". American Society for Testing Materials. 1957, p. 32-47. (TA480.T6 Am35s)

Annealing treatments originating in the β field appeared to produce a stable condition more rapidly than annealing treatments originating in the α-β field. Instability found in a 5% Cr alloy is related to the formation of eutectoid products. The substitution of Mo for half of the Cr retards the eutectoid reaction resulting in a more stable condition.

5749 A Micro Notched-Bar Impact Test for Titanium Alloys. F. C. Holden, H. R. Ogden, and R. I. Jaffee. Paper from "Symposium on Titanium". American Society for Testing Materials. 1957, p. 124-129. (TA480.T6 Am35s)

The test is useful in studying impact behavior where insufficient material is available for the standard V-notch Charpy test. Test specimens can be machined inexpensively from ¼-in. diameter rod stock. Date for several Ti alloys and other materials show the comparison between this test and standard impact tests.

5750* (English.) **Fatigue of Metals. I.** C. E. Phillips. *Teknisk Ukeblad*, v. 105, no. 1, Jan. 2, 1958, p. 11-17.

Several types of testing machines are described.

5751 Effect of Environments of Sodium Hydroxide, Air, and Argon on the Stress-Rupture Properties of Nickel at 1500° F. Howard T. McHenry and H. B. Probst. *U. S. National Advisory Committee for Aeronautics, Technical Note* 3987, Jan. 1958, 23 p. (TL570 Un3t)

Sodium hydroxide had little effect on the stress-rupture strength of Ni tubes tested in Ar at 1500 F for times up to 200 hr. Severe intergranular and surface oxidation increased the time-to-rupture of specimens wholly tested in air over that of specimens wholly tested in Ar.

5752 The Effect of Various Machining Processes on the Reversed-Bending Fatigue Strength of A-110 AT Titanium Alloy Sheet. Robert J. Rooney. *Wright Air Development Center Materials Laboratory, WADC Technical Report* 57-310, Nov. 1957, 9 p. (TL507 Un3.18w Vis.)

Results of ultrasonic, slab milling, chem-milling, grinding, and electrical discharge machining were investigated.

5753* (Russian.) Measuring the Dynamic Hardness of Metals. **K voprosu o metode izmereniia dinamicheskoi tverdosti metallov.** E. I. Timofeev and L. A. Urvantsov. *Zavodskaia Laboratoriia*, v. 23, no. 11, Nov. 1957, p. 1365-1368.

A method described is based on the inculcation force of a tip in a sample. The results obtained are compared with those found by other methods.

5754* (German.) Magnetic Susceptibility Measurements in the Copper-Manganese System. **Magnetische Messungen im System Kupfer-Mangan.** Erich Scheil and Ernst Wachtel. *Zeitschrift für Metallkunde*, v. 48, no. 11, Nov. 1957, p. 571-582.

Maximum susceptibility between 20 and 25 at.% Mn. Increase of this maximum by aging at low temperatures. Rapid decrease by plastic deformation. Antiferromagnetic behavior of the alloys in the disordered state and ferromagnetic behavior at low temperature when ordered.

5755* (German.) Conductivity and Hall-Constant. **Leitfähigkeit und Hallkonstante. III.** α-Copper-Zinc Alloys. **α-Kupfer-Zink-Legierungen. IV.** Copper-Nickel Alloys. **Kupfer-Nickel-Legierungen. V.** Copper-Nickel-Zinc Alloys. **Kupfer-Nickel-Zink-Legierungen.** Werner Köster and Wolfgang Schüle. *Zeitschrift für Metallkunde*, v. 48, no. 11, Nov. 1957, p. 588-600.

Measurement of the electrical resistance and Hall constant as dependent on preliminary thermal and mechanical treatment. Investigation of short range order. Increase of resistance with cold work. Change of state in recrystallized Cu-Ni specimens below 650 C and in ternary alloys below 500 C.

5756* (German.) A Contribution to the Calculation of the Viscosity of Molten Metal. **Beitrag zur Berechnung der Viskosität geschmolzener Metalle.** Anton Hrbek. *Zeitschrift für Metallkunde*, v. 48, no. 11, Nov. 1957, p. 603-605.

Thermodynamic interpretation of a new relation concerning the effect of temperature on the inner friction of molten metal. Possible linear dependence between the reduced activation energy of viscosity and the heating of the melt above the fusion point.

See also: **5575** (thermal shock and fatigue); **5607** (internal friction in stainless steel); **5686** (properties of gray cast iron); **5689** (tensile tests on Silumin); **5699** (properties of patented wire); **5769** (shot peening and working stresses); **5793** (deformation twinning in Mg); **5794** (fracture in Mg monocrystals); **5795** (creep of Al); **5813** (dimension changes in quenched steel); **5818** (plastic deformation of Al); **5871** (nuclear evaporation in Cu); **6148** (properties of welds).

METALS—MECHANICAL WORKING

5757* (German.) Machining of Aluminum Rolling Ingots With a New High Performance Milling Machine. **Über die Bearbeitung von Walzbarren aus Aluminium mit einer neuzeitlichen Hochleistungsfräsmaschine.** A. Roth. *Aluminium*, v. 33, no. 12, Dec. 1957, p. 789-793.

Modern machine is capable in the smallest size of machining at 4, and in the largest at 36 tons per hr.

5758* Oxidation of Components of Soluble Oils. Lee F. Ellis, R. Samuel-Maharajah, Laura May Mendelow, Larry Ruth, and Hilliard Pivnick. *Applied Microbiology*, v. 5, Nov. 1957, p. 345-348.

Components of metalworking coolants and lubricants vary in their susceptibility to microbial oxidation. Compounds which were resistant to oxidation by all three pure cultures used in this study were generally resistant to mixtures of bacteria obtained from emulsions used industrially. Fatty materials and derivatives of fatty materials were readily oxidized by bacteria while petroleum products and wood rosin soap were resistant.

5759* Rolling Mills for Fuel Elements. A. I. Nussbaum. *Atomics & Nuclear Energy*, v. 9, Jan. 1958, p. 16-19.

Rolling and fabrication of the many new metals required for the atomic age. Special equipment, special care to avoid radioactive hazards, and a knowledge of the properties of the materials are required. (To be continued.)

5760* Post-Process Gaging Provides Versatile Machine Control. R. Allen Souler. *Automation*, v. 5, Jan. 1958, p. 81-84.

How components of in-process gaging systems are used to provide post-process control of machines and classification of workpieces. (To be continued.)

5761* Non-Contact Automatic Gauge Control. First Installation in a Strip Mill. *British Steelmaker*, v. 24, Jan. 1958, p. 18-21.

Describes a Sr^{90} activated non-contact, measuring and automatic gage control device for rolling mills.

5762* Measuring the Coefficient of Friction in Cold Strip Rolling. Hiroshi Yamanouchi and Yuji Matsuura. *Castings Research Laboratory, Report, Waseda University*, 1957, no. 8, p. 57-62.

The simultaneous value of roll force and back tension are measured.

5763* Drawing of Sheet Through a Rotating Roll. H. Yamanouchi and I. Hayashi. *Castings Research Laboratory, Report, Waseda University*, 1957, no. 8, p. 63-66.

Theoretical and experimental determination of drawing forces and roll pressures.

5764 Numerically-Controlled Point-to-Point Positioning Systems. I. John D. Conney and Byron K. Ledgerwood. *Control Engineering*, v. 5, Jan. 1958, p. 67-98.

To cover all known domestic and foreign numerically controlled point-to-point positioning systems for use on jig borers, drill presses, and punch presses. (To be continued.)

5765* Stag Allenite Tungsten Carbide Plowrake and Plowcast Tools. *Edgar Allen News*, v. 37, Jan. 1958, p. 1-4.

Describes use of "Plowrake" (for planing steel) and "Plowcast" (for planing cast iron) tools manufactured by Edgar Allen & Co., Ltd., of London, England. In machining steel, these tools must be used with an efficient lifting device on the return stroke; feeding should be mechanical, and not by hand; the tools are of a shape best suited to "straight across cutting" as in major stock removal.

5766* (German.) New Method of Surface Strengthening. **Neues Verfahren zur Oberflächenverfestigung.** A. A. Worobjow. *Feingerätetechnik*, v. 6, no. 11, Nov. 1957, p. 493-494.

Efficient strengthening method that increases the fatigue as well as corrosion fatigue resistance of machine parts under live load.

5767* (Czech.) Development of Automation in Soviet Rolling Mills. **Rozvoj automatisace v sovětských válcovnách.** Eduard Červený. *Hutnické Listy*, v. 12, no. 11, Nov. 1957, p. 1053-1056.

General conditions of automation development in USSR and other countries. Contemporary state in USSR mills. Present experiences and necessary steps for assurance of fast development of rolling mill automation.

5768* Fabricating Titanium. *Industrial Finishing (London)*, v. 9, Dec. 1957, p. 996-997.

Tests made to determine the most suitable temperatures and methods for extrusion of Ti and its alloys and to eliminate H contamination.

5769* The Use of Shot Peening to Reduce Weight. W. R. Berry. *Institution of Mechanical Engineers, Automobile Division, Proceedings*, 1955-56, no. 7, p. 219-232 + 2 plates.

Explores the possibilities of utilizing the shotpeening process on laminated spring leaves from silico-manganese spring steel as a means of increasing the working stresses, and thus reducing weight.

5770* (Swedish.) Turning or Grinding Roll Grooves. A Comparison. **Svarvning eller slipning av spar i valsar. En jämförelse.** Torsten Palm. *Jernkontorets Annaler*, v. 141, no. 11, 1957, p. 790-797.

Investigation on chilled rolls. The higher surface quality of a ground groove in comparison with that of a turned one soon disappears. The wear of the groove determines the time after which continued rolling would lead to rejection.

5771* (Hungarian.) Production of Dynamo and Transformer Sheets. **Dinamó- és transzformátorlemezgyártás. I.** Ernö Neuhöffer. *Kohászati Lapok*, v. 12, no. 7, July 1957, p. 289-291.

Laboratory experiments for determining possibilities of decreasing the iron loss of the sheets and increasing their bend resistance.

5772 How to Design for Form Rolling of Knurls, Splines, and Serrations. *Machine Design*, v. 30, Jan. 9, 1958, p. 105-112.

Design and specification of thread and form-rolled parts.

5773 Stretching the Wings of a DC-8. O. L. Rumble. *Machinery*, v. 64, Jan. 1958, p. 121-124.

A unique stretch-forming press stretches a 10- by 46-ft. tapered Al section with a four-directional pull.

5774 When and How to Use Throw-Away Inserts for Cutting Tools. Charles H. Wick. *Machinery*, v. 64, Jan. 1958, p. 161-175.

Applications and uses of many commercial types are described and illustrated and their applications discussed. Thin tips of oxide or carbide material can be clamped in holders of various design, eliminating costly tool grinding. When one cutting edge becomes dull, a sharp edge can be rapidly presented to the work by indexing the tip in the holder.

5775 The Re-Servicing of Carbide Tools. *Machinery (London)*, v. 92, Jan. 17, 1958, p. 136-147.

For work involving feeds in excess of 0.010 in., the surface finish and the cutting edge produced by spark-erosion methods are satisfactory, without subsequent diamond lapping. To use diamond wheels in these circumstances is wasteful, and, if spark-erosion is adopted, it may be possible to achieve savings. For work involving feeds below 0.010 in., a diamond-lapped tool is normally desirable.

5776* How to Get More From Your High Production Machines. Harry Conn. *Machine and Tool Blue Book*, v. 53, Feb. 1958, p. 113-135.

The most prevalent mistake in metal cutting today is that we want to derive the most from our cutting tools instead of optimum return on the greater investment, the machine tool. The most efficient cut as far as the cutting tool is concerned may not be the most efficient type of a cut to turn a profit on the machine tool investment. Tables and graphs are given which show relationships between cutting speed, feed, and tool life for high speed steel, cemented carbide, and Al_2O_3 tools.

5777* (Italian.) Modern Trends in the Rolling of Special Steel. **Moderni orientamenti nella laminazione degli acciai speciali.** N. Cremonese. *Metallurgia Italiana*, v. 49, no. 11, Nov. 1957, p. 763-773.

Severe limitations in shapes to be rolled. Extreme variety of steel grades. Severe requirements of dimensional accuracy or surface conditions. Problems concerning heating equipment, mill layout, and types of stands.

5778* Production Speeded by Cold Extrusion. Karl Sieber. *Metalworking Production*, v. 101, Dec. 13, 1957, p. 2215-2219.

Important gains in production efficiency, reduction of materials costs and improvement in the quality of the product are claimed for the application of the cold extrusion technique in a multi-stage press equipped with carbide dies.

5779* The Chattering Lathe Tool. II. S. A. Tobias and W. Fishwick. *Metalworking Production*, v. 101, Dec. 13, 1957, p. 2229-2234.

Mathematical theory is set out in the form of stability charts. With these, chatter arising during the first revolution of the workpiece and that arising during subsequent revolutions are analyzed. Effects of work velocity, material, tool geometry, shank, and so on, are discussed.

5780 Titanium Sheet Rolling Program. *National Academy of Sciences, National Research Council, Materials Advisory Board Report No.* MAB-110-M(7), Sept. 1957, 61 p. (TN1 N21.5r Contin.)

5781 The Ejection and Handling of Large Components in Pressworking. J. H. Stephens. *Sheet Metal Industries*, v. 35, no. 369, Jan. 1958, p. 23 + 12 pages.

Press layout, production costs, conveyors, loaders, "iron hands", automation equipment for various types of dies, press speeds, and operator safety, are among the subjects considered.

5782 Production of Close-Tolerance Brass Strip. Automatic Gauge Control in Use in Birmingham Works. *Sheet Metal Industries*, v. 35, no. 369, Jan. 1958, p. 55-59.

5783 (German.) Contribution to the Problem of Drawing and Upsetting Cold-Rolled Steel Bars. **Über das Ziehen und Einstoss en von kalt gewalztem Stabstahl.** Winfrid Dahl and Werner Lueg. *Stahl und Eisen*, v. 77, no. 25, Dec. 12, 1957, p. 1795-1802.

Materials tested and testing methods. Forces involved in drawing and upsetting. Comparison of the test results with theoretical considerations. Hardness determinations in the area of transition from the shaped into the unaltered part of the bar.

5784 (German.) Investigation of Rolling Oils and Oil Emulsions in the Cold Rolling Test. **Untersuchung von Walzölen und Walzölemulsionen im Kaltwalzversuch. I.** Rolling Tests With Lubricants Composed of Pure Base Oils and Additives. **Walzversuche mit aus reinen Grundölen und Zusätzen aufgebauten Schmierstoffen.** Werner Lueg, Paul Funke, and Winfrid Dahl. *Stahl und Eisen*, v. 77, no. 25, Dec. 12, 1957, p. 1817-1830.

Investigations of lubricants currently used in rolling. Testing equipment, measuring methods, and materials used. Relation between lubricating effect and lubricant characteristics. Influence of lubricant composition on rolling conditions.

5785 Plastics in the Toolroom. *Steel*, v. 142, Feb. 3, 1958, p. 108-111.

Reinforced epoxies can save up to 70% of the cost of conventional dies.

5786* Calculating Economic Cutting Speeds. Frank J. Gallagher. *Tool Engineer*, v. 40, Jan. 1958, p. 98-102.

Cutting speeds for lowest-cost production can be readily calculated, using simple arithmetic and a nomogram.

5787* Solving Machining Problems With Chemical Milling. Arthur Colton. *Tool Engineer*, v. 40, Jan. 1958, p. 119-124.

Development of the process; typical applications.

5788* Subzero Temperatures Facilitate Production Processes. Robert A. Wason. *Tool Engineer*, v. 40, Feb. 1958, p. 107-115.

At subzero temperatures, cutting times are reduced and tool life is increased. Low-temperature treatments can stabilize and improve metallurgical properties. Applications in finishing, assembly, and inspection are discussed.

5789* Production Practices in the Fabrication of Stainless Steel Honeycomb Sandwich Structures. W. J. Lewis, G. E. Faulkner, and P. J. Rieppel. *Tooling and Production*, v. 23, Jan. 1958, p. 73-77.

Stainless steel honeycomb sandwich structures are currently fabricated by brazing for use in aircraft and jet engine components. Both spot and seam welding are used to fabricate the core. There are two types of honeycomb core produced: expanded and preformed, depending on the manufacturing method. Fabrication of brazed sandwich panels follows usual brazing procedures in that close tolerances and extreme cleanliness are required. Machining, cleaning, and final assembly procedures are discussed.

5790* A Cold Answer to Some "Hot" Metal Problems. C. E. Ricketts. *Tooling and Production*, v. 23, Jan. 1958, p. 78-81.

High temperature alloys can now be cold worked by a new high-impact-spin technique.

5791* Factors That Affect the Performance of Coated Abrasives. S. L. Johnson. *Tooling and Production*, v. 23, Jan. 1958, p. 87-90.

5792* (German and French.) Bevel Cutting With the Blowpipe. A Modern Metal Working Method. **Der Schrägschnitt mit dem Schneidbrenner, ein modernes Verfahren der Metallbearbeitung.** Jean Prat. *Zeitschrift für Schweisstechnik*, v. 47, no. 12, Dec. 1957, p. 311-325.

"K" shaped bevel cutting. Equipment and practice. Hand cutting torch and cutting machines. Oxyacetylene cutters. Advantages of bevel cutting are ease, rapidity, economy, and efficiency with heavy parts.

See also: **4671** (fabricating the Redstone missile); **5554** (wire die lubrication); **5752** (effect of machining method on fatigue strength of Ti alloy); **5807** (cold working metals and lattice imperfections); **5849** (strip mill control).

METALS—METALLOGRAPHY, TRANSFORMATIONS, AND STRUCTURES

5793 (English.) **Additional Modes of Deformation Twinning in Magnesium.** R. E. Reed-Hill and W. D. Robertson. *Acta Metallurgica*, v. 5, no. 12, Dec. 1957, p. 717-727.

Evidence for the existence of two additional modes of deformation twinning produced by tensile stress parallel to the basal plane in Mg single crystals. The temperature dependence of both modes of twinning, in the range of -190 to 286 C, is unusual in that they are formed most readily at higher temperatures.

5794 (English.) **The Crystallographic Characteristics of Fracture in Magnesium Single Crystals.** R. E. Reed-Hill and W. D. Robertson. *Acta Metallurgica*, v. 5, no. 12, Dec. 1957, p. 728-737.

Single crystals strained in tension parallel to the basal plane were studied. Fracture in a twin was observed as the primary mode of failure.

5795 (English.) **Recrystallization During Creep of Pre-strained Aluminium.** J. H. Auld, R. I. Garrod, and T. R. Thomson. *Acta Metallurgica*, v. 5, no. 12, Dec. 1957, p. 741-746.

Time for the onset of recrystallization was found to increase progressively with increasing creep stress.

5796* (Italian.) X-Ray Diffraction Determination of Recrystallization Curves of Aluminum Versus Its Purity. **Determinazione roentgenografica delle curve di ricristallizzazione dell'alluminio in funzione del titolo.** M. Paganelli. *Alluminio*, v. 26, no. 12, Dec. 1957, p. 517-524.

The recrystallization range for one hour annealings was determined in Al of various purities, such as Raffinal, AP 8, AP 5, and AP 0.

5797* (German.) Electron Microscopic Studies of the Substructure of Chemically Polished Aluminum Surfaces. **Elektronenmikroskopische Untersuchung der Substruktur auf chemisch geglänzten Aluminiumoberflächen.** D. Altenpohl. *Aluminium*, v. 33, no. 12, Dec. 1957, p. 774-781.

Micrographs of Al samples revealed "sub-structure". Effect of previous treatment of the metal. Systematic correlation between the substructures and the position of the plane of observation in the crystal lattice, Al purity, cold reduction, and type of heat treatment.

5798* (German.) The Grain Boundary Formation and Heat Cracks in Aluminum. **Korngrenzenaufbau und Warmrissigkeit bei Reinaluminium.** F. Erdmann-Jesnitzer and G. Schweigel. *Aluminium*, v. 34, no. 1, Jan. 1958, p. 14-20.

Experimental proof that the grain boundaries melt before the crystal boundaries. Melting depends also on the degree of disorientation when heated below the m.p.

5799 Alloys of Aluminum, Thorium and Uranium. Gene E. Bobeck and H. A. Wilhelm. *Ames Laboratory (U. S. Atomic Energy Commission)*, ISC-832, Dec. 1956, 26 p. (UF767 Un3.1is Contin.)

The Al-rich corner of the ternary alloy system Al-Th-U was investigated by thermal and microscopic analyses to determine an area of low-melting alloys that could be used as a liquid metal fuel in U^{233} breeder reactors.

5800* (German.) The Transformation Processes in Steels With 12 to 14% Cr. **Das Umwandlungsverhalten von Stählen mit 12 bis 14% Cr.** Walter Peter and Werner Matz. *Archiv für das Eisenhüttenwesen*, v. 28, no. 21, Dec. 1957, p. 807-823.

Time-temperature-transformation diagrams for isothermal and continuous tests of steels with 0.07 to 2.07% C, and 12 to 14% Cr for ultra-high and for normal austenitizing temperatures.

5801 Constitution of the Uranium-Rich U-Nb and U-Nb-Zr Systems. A. E. Dwight and M. H. Mueller. *Argonne National Laboratory (U. S. Atomic Energy Commission)*, ANL-5581, Oct. 1957, 74 p. (UF767 Un3.1an Contin.)

The U-Nb binary system exhibits a continuous series of solid solutions above 850 C. At lower temperatures a miscibility gap exists. A monotectoid transformation occurs at 634 C. The β-uranium phase is restricted by Nb and disappears at 4 w/o Nb.

5802 Change in Structure of Cemented Carbides on Heating. P. K. Mikhailova. *Henry Brutcher Translation No.* 4045, 5 p. (From *Metallovedenie i Obrabotka Metallov*, no. 7, July 1957, p. 45-48.) Henry Brutcher, Altadena, Calif.

Heating Co-cemented WC tips resulted in decreased grain size and increased length of grain boundaries. Samples containing 94% WC and 6% Co were heated for 10 min. in a N atm. at 600, 800, 1000, and 1200 C. After heating, the maximum grain size was considerably lower and the fraction of -3μ grains larger. Heating about halved the size of the largest grain.

5803* (French.) Measuring the Self Diffusion Constants in Iron in the α Phase With Radioactive Tracers. **Mesure des constantes d'autodiffusion en du volume fer en phase α à l'aide des traceurs radiactifs.** Claude Leymonie, Paul Lacombe, and César Libanati. *Comptes Rendus*, v. 245, no. 22, Nov. 25, 1957, p. 1922-1925.

Applying the method of Krukov and Joukhovitsky to α-Fe and determining by means of radioactive tracers the diffusion constants of cubic centered Fe.

5804 The Mechanism of Low Temperature Mechanical Relaxation in Deformed Crystals. A. Seeger, H. Donth, and F. Pfaff. *Faraday Society, Discussions*, no. 23, 1957, p. 19-30. (TK1 F22d Vis.)

Discusses hysteresis, resonance, and relaxation mechanisms by which dislocations cause energy losses in crystals. The experimental evidence, in particular for the relaxation mechanism, is surveyed.

5805 Mechanism and Kinetics of the Allotropic Transformation of Tin. W. G. Burgers and L. J. Groen. *Faraday Society, Discussions*, no. 23, 1957, p. 183 + 3 plates. (TK1 F22d Vis.)

The first part deals with X-ray and microscopic observations of the transformation of single and polycrystalline material, and processes underlying nucleation and growth. The second part gives complete isothermal transformation curves for both transformations.

5806* (Czech.) Methods of Diffusion Study by Radioactive Isotopes. **Metody studia difuse pomocí radioaktivnich isotopů.** Josef Čadek and Emil Janda. *Hutnické Listy*, v. 12, no. 11, Nov. 1957, p. 1008 to 1020.

Especially advantageous are so called absorption methods using the radioactive isotopes, requiring neither the division of specimens on layers, nor the precise measurement of small distances.

5807* (English.) **Studies on the Lattice Imperfections in Solid Crystals and Their Application to the Problems of Cold-Working of Metals and Photographic Sensitivity. I. Study on the Lattice Imperfections in Metals and Alloys and Its Application to the Problem of Cold-Working.** Hiroshi Kanzaki. *Institute of Industrial Science, Report (University of Tokyo)*, v. 6, no. 6, Sept. 1957, p. 230-283.

5808 Carbide Precipitation in Several Steels Containing Chromium and Vanadium. Arun K. Seal and R. W. K. Honeycombe. *Iron and Steel Institute, Journal*, v. 188, Jan. 1958, p. 9-15 + 3 plates.

The behavior of an alloy steel on tempering depends primarily on the behavior of the carbide dispersion formed. The various alloy carbides differ in their effects partly because of differences in their tendency to remain as a fine dispersion.

5809* (Russian.) Widths of the Internal Planes and Density Distribution of the Electronic States as Affected by the Energy of the Transitional Iron Group Elements. **Shiriny vnutrennikh urovnei i raspredelenie plotnosti elektronnykh sostoianii po energiiam elementov perekhodnoi gruppy zheleza.** M. A. Blokhin and V. P. Sachenko. *Izvestiia Akademii Nauk SSSR, Seriia Fizicheskaia*, v. 21, no. 10, Oct. 1957, p. 1343-1350.

5810* (English.) **The Role of Interfacial Energy During Solid State Phase Transformations.** Mats Hillert. *Jernkontorets Annaler*, v. 141, no. 11, 1957, p. 757-789.

Calculation of changes of equilibrium at curved interfaces due to interfacial energy. Application to formation of nuclei from supersaturated solutions. Evaluation of composition and size of critical nucleus form free energy diagram. Change of new phase composition with growth.

5811 Effect of Oxygen on Etch-Pit Formation in Silicon. R. A. Logan and A. J. Peters. *Journal of Applied Physics*, v. 28, Dec. 1957, p. 1419-1423.

Etching behavior of as-grown and heat-treated Si crystals was studied. The rate of chemical etching was found to decrease with increased concentration of dissolved oxygen. This effect impedes the formation of etch-pits.

5812 Rate of Growth of Diffusion Layers in U-Al and U-AlSi Couples. L. S. DeLuca and H. T. Sumsion. *Knolls Atomic Power Laboratory (U. S. Atomic Energy Commission)*, KAPL-1747, May 1957, 34 p. (UF767 Un3.1ka Contin.)

Metallographic observation shows that the U-Al reaction layers form three to five times as fast as the U-AlSi layers over this temperature range.

5813* (Hungarian.) Processes Causing Change of Dimensions in Quenched Steel. **Méretváltozást okozó folyamatok az edzett acélban. II.** Zoltán Csepiga. *Kohászati Lapok*, v. 12, no. 10, Oct. 1957, p. 465-469.

A study of the volume variations of steel caused by the transformations towards equilibrium in tetragonal martensite and residual austenite.

5814* (Dutch.) Crystalline Structure and Recrystallization of Metals. **Kristallijne structuur en rekristallisatie van metalen.** W. G. Burgers and T. J. Tiedema. *Metalen*, v. 12, no. 23, Dec. 15, 1957, p. 478-484; no. 24, Dec. 31, 1957, p. 502-508.

Variation in the structure of crystal boundaries. Interfacial tension in Si-Fe crystals or Au-Pt alloys. Crystal growth, recrystallization of a deformed metal. Nucleation and polygonization.

5815* (German.) Investigations of AlCu Alloys by Color Etching Methods. **Untersuchungen mittels Farbätzverfahren an AlCu-Legierungen.** F. Erdmann-Jesnitzer and W. Bernhardt. *Metall*, v. 11, no. 12, Dec. 1957, p. 1032-1037.

Alloys of high purity Al and electrolytic Cu and with a trace of Mg, were melted in a graphite crucible. The distribution of Cu in the α-mixed crystal under extreme conditions and an increase of the dissolved Cu concentration towards the grain boundary were observed.

5816* (German.) Instances of the Application of New Techniques in Metallography. **Anwendungsbeispiele für neuere Verfahrenstechniken in der Metallographie.** L. Koch, G. Hein, and S. Keste. *Metall*, v. 11, no. 12, Dec. 1957, p. 1038-1045.

Critical survey of new techniques in grinding, polishing, etching, and examination under polarized light. Structure examination by means of color photography with the light microscope. Study of tensions, corrosion, and contact corrosion. Phase-contrast and high temperature microscopy. Microhardness testing.

5817* (Russian.) Recrystallization Processes in Nickel Alloys. **Rekristallizatsionnye protsessy v legirovannykh splavakh nikelia.** M. E. Blanter and L. I. Kuznetsov. *Metallovedenie i Obrabotka Metallov*, 1957, no. 12, Dec., p. 31-36.

The effect of Mo, Cr, Ti, and Co on the softening and recrystallization processes.

5818* (Russian.) Nature of the Critical Degree of Deformation. **Priroda kriticheskoi stepeni deformatsii.** Ia. R. Rauzin and A. R. Zhelezniakova. *Metallovedenie i Obrabotka Metallov*, 1957, no. 12, Dec., p. 41-48.

Recrystallization after limited plastic deformation of Al having different degrees of purity and varying grain sizes was studied.

5819* (Russian.) Distribution of Chromium Between Phases in White Iron. **O raspredelenii khroma mezhdu fazami v belom chugune.** I. E. Lev. *Metallovedenie i Obrabotka Metallov*, 1957, no. 12, Dec., p. 49-52.

By analysis of the ferrite and cementite of white iron it was found that Cr is concentrated mainly in the carbide phase. Its distribution between phases is not constant, and depends on many factors.

5820 Recent European Advances in Optical Metallography. Roland Mitsche. *Metal Progress*, v. 73, Jan. 1958, p. 97-101.

Modern microscopes are designed to avoid fatigue of the operator, with automatic timing, continuous focusing, and multiple light sources. Attachments exist for hardness tests and visual observations, in vacuum or controlled atmospheres, from -325 to +2700 F.

5821* (French.) Applications of Electron Micrography to Research in Iron Metallurgy. **Applications de la micrographie électronique à la recherche en sidérurgie.** J. Plateau and R. Tamhankar. *Métaux, Corrosion-Industries*, v. 32, no. 386, Oct. 1957, p. 359-381.

Classical methods and new processes. Phase changes and intercrystalline precipitations. Intergranular phenomena. Oxidation. Friction and wear. Effects of microstructure on mechanical properties. Plastic deformation. Rupture. Dusts and smokes.

5822 The Effect of Liquid Media on the Grey Tin ⇌ White Tin Transformation in Commercially Pure Tin. R. W. Smith and G. V. Raynor. *Physical Society, Proceedings*, v. 70, no. 456B, Dec. 1957, p. 1135-1142.

Dilatometric experiments using xylene, ethyl alcohol, alcoholic "pink salt" solution, and distilled water show that the rates of transformation of the $\alpha \rightarrow \beta$ and $\beta \rightarrow \alpha$ reactions in Sn are affected by the surrounding medium. All rates increase with temperature up to the highest investigated (29.86 C), and do not reach a maximum at about 25 C as reported previously.

5823 Stacking Faults and Dislocations in Copper-Aluminium and Cobalt-Nickel Alloys. J. W. Christian and J. Spreadborough. *Physical Society, Proceedings*, v. 70, no. 456B, Dec. 1957, p. 1151-1161.

The Fourier coefficients of the broadening function due to faults are calculated for the {111} and {200} powder lines, assuming equal densities of faults on all {111} planes, and these enable the strain broadening function to be evaluated from the measured coefficient.

5824 The Powder Method in X-Ray Crystallography. Leonid V. Azároff and Martin J. Buerger. 342 p. 1958. McGraw-Hill, New York. (QD945 Az16p)

A fundamental account of the principles and utilization of the method, intended for potential users with no specific training in making and interpreting powder photographs.

5825* (German.) Growth and Properties of Metal Fibers. **Wachstum und Eigenschaften von Metallfäden.** F. Blaha. *Radex Rundschau*, no. 7, Dec. 1957, p. 882-890.

Survey of the phenomena; mechanical properties and the theory. Survey of the phenomenon of filamentary growth of metals; mechanical peculiarities of whiskers; theories of their origin.

5826* (Russian.) Migration of Barium on the Surface of Some Metals. **Migratsiia bariia po poverkhnosti nekotorykh metallov.** G. F. Mitianskii. *Radiotekhnika i Elektronika*, v. 2, no. 12, Dec. 1957, p. 1491-1496.

By means of a cylindrical thermo-electron projector a comparative study of migration of Ba at the pure, carburized, Re coated, and Pt-W surface under high vacuum ($<3.10^{-9}$ mm. Hg) was made.

5827* An Experimental Determination of the Fermi Surface in Copper. A. B. Pippard. *Royal Society of London, Philosophical Transactions*, v. 250, ser. A, no. 979, Dec. 12, 1957, p. 325-357.

Measurements were made of the variation with crystal orientation of the anomalous skin resistance of plane surfaces of pure Cu at low temperatures and at a frequency of 22700 Mc.

5828* (English.) **New Oxidizing Method for Revealing Austenitic Grain.** Yûnoshin Imai and Hiroshi Hirotani. *Science Reports of the Research Institutes, Tôhoku University*, ser. A, v. 9, no. 6, Dec. 1957, p. 467-475.

When a specimen is exposed to air at high temperatures for a short time, the austenitic grain boundary is usually more oxidized than the matrix, and when such an oxidized specimen is dipped into molten borax, the thin film of oxide melts away into borax, and the grain boundary appears clearly as a thin groove.

5829* (English.) **Studies on the β-ε Transformation in Cobalt-Nickel Alloys. I. Propagation Process of the Transformation. II. Microstructure of Transformation Relief.** Sakae Takeuchi and Toshio Honma. *Science Reports of the Research Institutes, Tôhoku University*, ser. A, v. 9, no. 6, Dec. 1957, p. 492-519.

The propagation process of face-centered cubic→close-packed hexagonal lattice transformation was studied from the relief markings appearing on the crystal surface.

5830* (English.) **Diffusion of Sulfur in Liquid Iron. II. Diffusion in Liquid Iron Saturated With Carbon.** Yasuji Kawai. *Science Reports of the Research Institutes, Tôhoku University*, ser. A, v. 9, no. 6, Dec. 1957, p. 520-526.

The diffusion coefficient as measured between 1390 and 1560 C was found to be 2.9 to 3.5 x 10^{-5} cm.^{2}/sec., and its temperature dependence may be expressed as: $D=2.4 \times 10^{-4} \exp(-3800/T)$.

5831 Processing 310 Minimizes Carbides. Hiram Brown. *Steel*, v. 142, Jan. 27, 1958, p. 72-73.

Prestraining this stainless steel, followed by stress relieving at 1000 to 1400 F before solution heat treatment, precipitates carbides within the grains rather than at the grain boundaries.

5832* (German.) Solubility of Tungsten Carbide in Titanium Carbide. **Über die Löslichkeit von Wolframkarbid in Titankarbid.** J. Hinnüber and W. Kinna. *Technische Mitteilungen Krupp*, v. 15, no. 7, Dec. 1957, p. 155-160.

Lattice constant, phases, and solubilities were determined in the systems Ti-W-C and TiC-TaC-WC with and without additions of 2% Co. Addition of Co promotes solubility of WC and formation of crystals of mixed composition.

5833* (German.) Recrystallization Hardening of Titanium Alloys. Recrystallization Hardening and Regeneration in Titanium-Vanadium Alloys. **Zur Aushärtung von Titanlegierungen. Aushärtung und Rückbildung in Titan-Vanadium-Legierungen.** W. Knorr. *Technische Mitteilungen Krupp*, v. 15, no. 7, Dec. 1957, p. 178-193.

In binary Ti-V alloys containing 15% V, after formation of the ω-phase, hardness increased during quenching after annealing in the β-area. No ω-quenching occurred in alloys with 12 and 13% V. Hardness increased rapidly at 15% with tempering between 200 and 400 C.

5834* (Russian.) A Rapid Method for Isolation of the Carbide Phase in Steels. **Uskorennyi metod izolirovaniia karbidnoi fazy v staliakh.** O. S. Spiridonova and T. I. Bezuglova. *Zavodskaia Laboratoriia*, v. 23, no. 12, Dec. 1957, p. 1412-1413.

New method with the results obatined on three types of steel subjected to different thermal treatment.

5835* (Russian.) The Electron-Emission Method of Investigating Steel. **Metodika elektronno-emissionnogo issledovaniia stali.** K. V. Varli, K. A. Michurina, and Iu. A. Skakov. *Zavodskaia Laboratoriia*, v. 23, no. 12, Dec. 1957, p. 1443-1446.

Application of the method to recrystallization of silicon iron, $\alpha \rightleftarrows \gamma$ electrolytic transformation of iron, and behavior of nickel in 10X05 steel.

5836* (Russian.) A Method for Determination of Closed Porosity and Defective Structure. **Metod opredeleniia zamknutoi poristosti i defektnosti struktury.** B. V. Lukin and V. G. Nagornyi. *Zavodskaia Laboratoriia*, v. 23, no. 12, Dec. 1957, p. 1458-1461.

Method based on the comparison of specific weights obtained both by the X-ray and pycnometric methods.

See also: **4801** (metallography of uranium carbides); **4894** (metallographic testing); **5171** (orientation of monocrystals); **5176** (diffusion of H through Pd); **5201** (solubility of H in steel); **5693** (solidification of castings); **5707** (dislocations in Cu); **5723** (microstructure at high temperatures); **5743** (recrystallization of high-purity Al); **5943** (radioactivity and non-metallic inclusions in steel); **5970** (dislocations).

METALS—POWDER

5837* (Russian.) Preparation of Ductile Niobium. **Poluchenie plastichnogo niobiia.** O. P. Kolchin, N. V. Sumarokova, and N. P. Chuveleva. *Atomnaia Energiia*, v. 3, no. 12, Dec. 1957, p. 515-524.

Describes preparation of Nb powder by reduction of K_2NbF_7 with Na, and by reacting Nb_2O_5 with NbC. Ductile Nb was made by pressing and vacuum sintering up to 2350 C, followed by rolling or other metal-working treatment.

5838* (German.) Preparation of Electrolytic Metal Powders. **Elektrolytische Gewinnung von Metallpulver.** Wladislaw Tabor. *Chemische Technik*, v. 9, no. 11, Nov. 1957, p. 645-649.

Production and composition of Cu, Ni, Fe, and Ag powders from various electrolytes.

5839* (French.) Effect of Grain Size on the Kinetics of the Contraction of Iron Agglomerates From Carbonyl During Sintering in the α-Phase. **Influence de la grosseur du grain sur la cinetique du retrait d'agglomeres de fer ex-carbonyle au cours du frittage en phase α.** Georges Cizeron. *Comptes Rendus*, v. 245, no. 23, Dec. 4, 1957, p. 2051-2054.

The contraction kinetics can be changed by varying the temperature during the same sintering process. Acceleration or slowing down of the densification. Direct relation with variation of grain size.

5840 Powder Metal Press Gets Uniform Density in Odd Shapes. *Iron Age*, v. 180, Dec. 26, 1957, p. 56-57.

New hydraulic presses, ranging from 50 to 500-ton pressing capacity, feature high degree of uniform density by proportional pressing, dimensional accuracy with push-button control, and ease of setting up controls since the operator can reproduce a pressing operation by merely duplicating previous dial settings.

5841 Recent Advances in Cermets. Robert Steinitz. *Jet Propulsion*, v. 28, Jan. 1958, p. 15 + 3 pages.

Titanium carbide-nitride cermets are useful for high-temperature applications up to about 2000 F. For temperatures over 2500 F, ceramic oxides, carbides, borides, and silicides can be used, but are difficult to form and are quite brittle. The well-known low friction properties against steel of WC-TiC cutting materials is leading to investigation of use of hard metals against different hard metals for obtaining materials for high-temperature bearing applications.

5842 Alloys Containing Oxides. *Metal Industry*, v. 91, Dec. 20, 1957, p. 519-520.

In studies of Al_2O_3 and SiO_2 in Cu powder, specimens were prepared with oxide additions up to 10%. Pressed and sintered samples were swaged to 50% reduction followed by an annealing treatment. The SiO_2-bearing samples offered little or no advantage over pure Cu. Additions of Al_2O_3 to the Cu powder, however, resulted in an increase in the recrystallization temperature and a decrease in the fall of hardness accompanying recrystallization.

5843 Powder Metallurgy. IX. J. F. C. Morden. *Metal Industry*, v. 92, Jan. 17, 1958, p. 43-46.

Briefly discusses broad aspects of a number of metallurgical methods and equipment including sintering in salt baths and vacuum resistance and induction furnaces, liquid phase and activated sintering, and effect of powder characteristics and compacting pressure on properties. Salt baths can be used up to 1300 C; they provide quick and uniform heat out of contact with air, but, after sintering require tedious washing or other treatment to remove the salt from the pores of the piece. Describes an electric resistance furnace for sintering W rods, and a G. E. furnace for vacuum sintering in which the charge is heated by radiation from a triangular-shaped assembly of graphite bars which surrounds the charge space.

5844 Powder Metallurgy. Technique and Applications. *Metallurgia*, v. 56, no. 338, Dec. 1957, p. 271-275.

A brief account of general developments in powder metallurgy with particular reference to the production and testing of metal powders and the manufacture of articles from them by compaction and sintering. Materials best suited for various applications are discussed.

5845 Report on Powder Metallurgy in the U.S.S.R. Henry H. Hausner. *Metal Progress*, v. 73, Jan. 1958, p. 105 + 4 pages.

Concludes that powder metallurgy in the U.S.S.R. is growing faster than in other countries, including the U. S. Much attention is being given to cermets, borides, and carbides.

5846* (English.) **Sintered Aluminium S.A.P.** F. Bollenrath. *Tidsskrift for Kjemi, Bergvesen og Metallurgi*, v. 17, no. 10, 1957, p. 165-170.

Reviews production, fabrication, and properties of sintered bodies from pure Al powder, containing limited percentages of aluminum oxides, with mechanical properties. especially at elevated temperatures, that are much better than the properties of normal Al and similar to or even better than those of the heat treated Al-Cu-Mg type.

See also: **5159** (gases on Ge powder); **5209** (oxide protective coating for sintered steel parts); **5700** (cyaniding of sintered Fe parts).

NONDESTRUCTIVE TESTING AND QUALITY CONTROL

5847 Analyzing and Controlling Products From Color Measurements. Leo G. Glasser. *Control Engineering*, v. 5, Feb. 1958, p. 93-98.

The basics of color measurement; operation of laboratory colorimeters for product investigations and control and plant-type colorimeters for abbreviated color measurements; preparation of product samples.

5848 New Jobs for Radioisotopes. F. T. Wood, Jr. *Factory Management and Maintenance*, v. 116, Jan. 1958, p. 72-73.

Discusses uses of radioisotopes in measuring coatings, testing a rinse, testing sealants, probing welds, and testing concentration.

5849 Strip Mill Control. Nucleonic Thickness Gauge Automatically Governs Screw-Down. *Iron & Steel*, v. 31, Jan. 1958, p. 8-10.

5850* Non-Destructive Testing; a Literature Search. Richard J. Smith and Thomas W. Scott, compilers. 11 p. 1957. Available from the Office of Technical Services, Dept. of Commerce, Washington, D. C. (ZTA410 Un3.1n Ref.)

Bibliographic and availability information is given for 70 AEC reports and 18 non-AEC reports in which are described the following non-destructive testing techniques; sonic, ultrasonic, radiographic, radioautographic, fluorescent penetrant, electromagnetic, frost, eddy current, and leak testing.

5851* (French.) Non-Destructive Testing of Rotors and Other Parts of Water Turbines. **Les contrôles non destructifs des roues et organes de turbines hydrauliques.** J. Thouvenin. *Revue de Métallurgie*, v. 54, no. 12, Dec. 1957, p. 945-959.

Different methods of testing including visual, ultrasonic, magnetic, penetrant, and γ radiographic examination.

5852* (Czech.) Testing of Machine Parts by Nondestructive Methods. **Kontrola strojních součástí nedestruktivními metodami.** Václav Blažek. *Strojírenská Výroba*, v. 5, no. 12, Dec. 1957, p. 563-565.

Methods for reliable defect detection in material. Electromagnetic method for detection of surface or close to surface defects. Detection of inner defects by means of ultrasonic equipment.

5853 A Method for Evaluating Materials Used in Penetrant Flaw Detection. R. W. Miller. *Welding Journal*, v. 37, Jan. 1958, p. 30-33.

Use of a pressure-type device that provides a standard fissure suitable for evaluating penetrant flaw-detection materials is proposed.

See also: **5924** (isotopes for industrial measurements); **6178** (quality control charts and acceptance sampling).

NUCLEAR PHYSICS, NUCLEONICS, AND RADIATION

5854* (French.) The History of Cosmic Radiation. **Histoire du rayonnement cosmique.** Louis Leprince-Ringuet. *Âge Nucléaire*, 1957, no. 7, Nov.-Dec., p. 16-22.

5855* (French.) Cosmic Radiation and the Solar System. **Rayonnement cosmique et système solaire.** Jean Heidmann. *Âge Nucléaire*, 1957, no. 7, Nov.-Dec., p. 23-26.

Modulation of the galactic cosmic rays by solar activity, production of cosmic rays by the sun. Various hypotheses.

5856* (German.) Literature in the Field of Nuclear Research. **Die Literatur auf dem Gebiet der Kernforschung.** F. Weigel. *Angewandte Chemie*, v. 69, no. 23, Dec. 7, 1957, p. 747-753.

A survey of reports on nuclear energy, access to which is difficult, and possibilities of evaluating them.

5857* (French.) The Electric Field Gradient in the Hydrocyanic Acid Molecule and the Determination of the Quadrupolar Moment of N^{14}. **Le gradient de champ électrique dans la molécule d'acide cyanhydrique et la détermination du moment quadrupolaire de N^{14}.** A. Bassompierre. *Annales de Physique*, v. 2, ser. 13, nos. 9-10, Sept.-Oct. 1957, p. 676-713.

5858 Annual Review of Nuclear Science. James G. Beckerley, Robert Hofstadter, and Leonard I. Schiff, editors. v. VII. 496 p. 1957. Annual Reviews, Inc., Palo Alto, Calif. (QC780 An78 Vis.)

Mu-meson physics. Radiochemical separations and associated equipment. High-energy electron reactions. Collective model theories for nuclei. Cellular and vertebrate radiobiology. Biochemical effects of ionizing radiation. Hyperons and heavy mesons.

5859 The EBR-I Meltdown—Physical and Metallurgical Changes in the Core. J. H. Kittel, M. Novick, and R. F. Buchanan. *Argonne National Laboratory (U. S. Atomic Energy Commission)*, ANL-5731, Nov. 1957, 81 p. (UF767 Un3.1an Contin.)

Covers disassembly operations on EBR-I at the Lemont, Ill. site of the Argonne National Laboratory, which underwent a partial meltdown on Nov. 29, 1955.

5860* (Russian.) A High Resolving-Power Electromagnetic Isotope Separator for Heavy Elements. **Elektromagnitnaia ustanovka s vysokoi razreshaiushchei siloi dlia razdeleniia izotopov tiazhelykh elementov.** L. A. Artsimovich, et al. *Atomnaia Energiia*, v. 3, no. 12, Dec. 1957, p. 483-491.

Designed to separate isotopes having about 1/240 comparative difference in mass. Data of Pb, U, and Pu isotope separation.

5861 The Attenuation of Gamma Rays and Neutrons in Reactor Shields. Herbert Goldstein. 295 p. 1957. Available from Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. (QC799.S6 Un3.1a)

Sources of neutrons and γ-rays; experimental bulk shielding facilities for the study of neutron and γ-ray attenuation; calculations of fast neutron penetrations.

5862 Radiation Damage Studies in Solids; Nuclear Resonance Absorption Technique. P. J. Bray. *Brown University (U. S. Atomic Energy Commission)*, NYO-7624, Sept. 1957, 25 p. (UF767 U3ny Contin.)

Effects measured in several alkali halides, which have received reactor irradiation, are in substantial agreement with the calculations of Seitz and Koehler. Other studies are reported.

5863 Evidence for the Formation of Long-Lived Bi^{208} by the $(n, 2n)$ Reaction on Bismuth. J. C. Roy, T. A. Eastwood, and R. C. Hawkings. *Canadian Journal of Physics*, v. 36, Jan. 1958, p. 18-24.

Long-lived Bi^{208} was observed through its decay by electron capture to the first excited state of Pb^{208}. It was produced by the $(n, 2n)$ reaction on Bi^{209} in the NRX reactor. The half-life of Bi^{208} was estimated at 3×10^4 yr.

5864 A Large-Area Liquid Scintillation Counter and Some Measurements on High-Energy Cosmic-Ray Particles. C. H. Millar, E. P. Hincks, and G. C. Hanna. *Canadian Journal of Physics*, v. 36, Jan. 1958, p. 54-72.

Counter consists of a 29% by 29% by 2-in. Plexiglas tank of terphenyl plus α-naphthylphenyloxazole in triethylbenzene surrounded by MgO powder and viewed by a total of eight RCA Type 5819 photomultiplier tubes along two opposite edges.

5865 Mass Assignment of the 1.8 Hour Ytterbium Activity. R. H. Betts, Olive F. Dahlinger, and Donna M. Munro. *Canadian Journal of Physics*, v. 36, Jan. 1958, p. 73-81.

The rate of growth of Lu^{177} into neutron-irradiated Yb was measured by radioassay of Lu fractions separated by ion-exchange techniques.

5866 Wraps Are Off Thermonuclear-Fusion Progress. *Chemical Week*, v. 82, Feb. 1, 1958, p. 20-23.

Full realization of fusion's role as a new source of power is a long way off, estimates range from 10-40 yr., but U. S. and British research teams are optimistic.

5867 The Use of Radioactive Isotopes and High-Energy Radiation in Polymer Chemistry. H. W. Melville. *Chemistry and Industry*, 1957, no. 51, Dec. 21, p. 1632-1638.

High energy radiations producing chemical changes are illustrated in regard to their application to the chemistry of high polymers.

5868* (French.) Study of the $\beta+$ Radiation of the Long-Lived Isomer of Technetium 95. **Étude du rayonnement $\beta+$ émis par l'isomère à vie longue du technetium 95.** Christiane Levi, Lily Papineau, and Noëlle Saunier. *Comptes Rendus*, v. 245, no. 22, Nov. 25, 1957, p. 1918-1920.

5869* (Russian.) A Study of the β^+ Decay in Ho^{160}. **Issledovanie β^+ - raspada v Ho^{160}.** B. S. Dzhelepov, O. E. Kraft, and B. K. Preobrazhenskii. *Doklady Akademii Nauk SSSR*, v. 116, no. 4, Oct. 1, 1957, p. 581-583.

A study of Ho and Er fractions by means of a lens spectrometer, a $\pi\sqrt{2}$ spectrometer, and by the scintillation method, showed that the conversion electrons corresponding to transitions with energies: 196, 298, 539, 648, 730, 876, and 967 k.e.v. belong to isotope Ho^{160}, whose half-life is 5.3 hrs.

5870* (Russian.) Dispersion Relations for the Scattering of K-Mesons on Nucleons. **Dispersionnye sootnosheniia dlia rasseianiia k-mezonov na nuklonakh.** M. K. Polivanov. *Doklady Akademii Nauk SSSR*, v. 116, no. 6, Oct. 21, 1957, p. 943-945.

5871 (French.) Nuclear Evaporation in Cu. **Evaporation nucléaire dans Cu.** E. Jeannet, J. Rossel, and E. Vaucher. *Helvetica Physica Acta*, v. 30, no. 6, 1957, p. 484-488.

Sandwich emulsion method applied to the study of evaporation traces in Cu. They are not explained by the evaporation theory but possibly by local nucleus excitation. Height of the barrier of the Coulomb potential is expressed.

5872 High Energy Nuclear Physics. Proceedings of the Seventh Annual Rochester Conference, April 15-19, 1957. G. Ascoll, et al, editors. Sections individually paged. 1957. Interscience Publishers, New York. (QC173 H53)

The discussions dealt with experimental and theoretical developments in high-energy physics during the previous year.

5873* Studies With Scintillation Coincidence Spectrometer: Se^{75} and Sb^{125}. Girish Chandra. *Indian Academy of Sciences, Proceedings*, v. 46, Nov. 1957, p. 360-366.

5874 Application of the Mass Spectrometer to the Study of the Upper Energy States of Molecules. J. D. Morrison. *Journal of Applied Physics*, v. 28, Dec. 1957, p. 1409-1413.

By making certain assumptions about the probability of ionization for different processes, ionization efficiency curves can be interpreted to give the probabilities for electronic transitions from the ground state to the various ionic states of molecules. Information can be deduced about the potential energy functions for these upper states.

5875 Measurements of the Effective Resonance Integral in Uranium Metal and Oxide in Different Geometries. Erick Hellstrand. *Journal of Applied Physics*, v. 28, Dec. 1957, p. 1493-1502.

Measurements were performed on simple rods, on a few tubes, empty or filled with a moderator, and on clusters of rods. Formulas for the effective resonance integral are given for metal and UO_2.

5876 Calculation of Energy Dissipation by Gamma Radiation Near the Interface Between Two Media. Martin J. Berger. *Journal of Applied Physics*, v. 28, Dec. 1957, p. 1502-1508.

A Monte Carlo calculation was made of the energy dissipation by γ radiation in a medium with the scattering properties of water. The calculations are for a 1.28 m.e.v. point-isotropic source at or near the boundary plane separating the two regions.

5877 (French.) Reduction Phenomena Produced by Nuclear Radiations on the Aqueous Solutions of Mineral Compounds. **Phenomènes de réductions provoqués par les rayonnements nucléaires sur les solutions aqueuses de composés minéraux.** Marc Lefort. *Journal de Chimie Physique*, v. 54, no. 10, Oct. 1957, p. 782-788.

Reduction of Ce ions in a normal sulfuric acid medium. Effect of impurities. Effects of γ- and α-rays on bichromate ions. Other systems; Tl, Co, V. Potassium permanganate solutions. Results with Po α-rays.

5878 Reprocessing Uranium by the deBoer Volatile Iodide Process. W. L. Robb. *Knolls Atomic Power Laboratory (U. S. Atomic Energy Commission)*, KAPL-1788, May 1957, 25 p. (UF767 Un3.1ka Contin.)

Decontamination from all long-lived radioactive fission products except Zr was obtained by forming UI_4, volatilizing the iodide, and then decomposing it to deposit U metal on a hot wire.

5879 The Fast Oxide Breeder—Reactor Analysis. I. Neutron Yields, Cross Sections, Group Constants, and Machine Routines. G. A. Baraff and R. G. Mallon. **II. Reactor Calculations.** D. F. Molino and J. K. Davidson. *Knolls Atomic Power Laboratory (U. S. Atomic Energy Commission)*, KAPL-1756, June 1957, 57 and 35 p. (UF767 Un3.1ka Contin.)

5880 The Fast Oxide Breeder—Radiation Effects in Chemical Processing of Fuel. S. S. Jones. *Knolls Atomic Energy Commission)*, KAPL-1758, June 1957, 38 p. (UF767 Un3.1ka Contin.)

Ways in which breeder fuel processing may be affected by absorption of fission-product radiations.

5881 The Determination of Uranium in UO_2-Al_2O_3 Fuel Elements by X-Ray Emission Spectrography. W. D. Moak and W. J. Pojasek. *Knolls Atomic Power Laboratory (U. S. Atomic Energy Commission)*, KAPL-1879, Sept. 1957, 15 p. (UF767 Un3.1ka Contin.)

The fuel elements are dissolved by fusion in potassium pyrosulfate, and the U in solution is excited by a primary X-ray beam from a W tube. The intensity of fluorescent uranium La_1 is measured by means of a crystal spectrometer and a scintillation counter.

5882 Neutron Fluxes, Gamma-Ray Dose Rates, and Temperatures in the Iron-Magnetite Concrete Shield of the Omega West Reactor. Avery M. Gage. *Los Alamos Scientific Laboratory (U. S. Atomic Energy Commission)*, LA-2155, Dec. 1957, 84 p. (UF767 U3La Contin.)

The measured effective decade length for the fast neutron flux is 8.1-in. The average Cd ratio is 2.4. The distribution of γ-ray dose rates, measured with dosimeters, has a decade length of 7.0-in. At the outer surface of the shield (4-ft. of water and 5-ft. of concrete) the fast neutron leakage is 0.1 neutrons/cm^2-sec.

5883 Equipment for Experiments With Activities Having Half-Lives in the Range From 10 μSec to 1 Sec. James Paul Glore. *Los Alamos Scientific Laboratory (U. S. Atomic Energy Commission)*, LA-2152, Jan. 1958, 31 p. (UF767 U3La Contin.)

Electronic circuits were built for conducting experiments with radioactivities in the above range. The Model 10 Beam Shim Pulser was designed for pulsing the beam of an electrostatic generator.

5884* (Hungarian.) Neutron Counter of Uniform Sensitivity. **Egyenletes érzékenységű neutronszámláó.** László Vályi. *Magyar Fizikai Folyóirat*, v. 5, no. 5, 1957, p. 405-412.

Description of counting apparatus with uniform sensitivity below 1 m.e.v. Calibration measurements.

5885 Fuel Elements for the Organic Moderated Reactor Experiment. C. T. Armenoff and M. H. Binstock. *North American Aviation, Inc. (U. S. Atomic Energy Commission)*, NAA-SR-1934, Dec. 1957, 82 p. (UF767 Un3.1na Contin.)

The fuel element is a stainless-steel box containing 16 active fuel plates which "float" in longitudinal grooves. The floating plates minimize distortion caused by the large temperature differences experienced with the use of an organic coolant.

5886 Zirconium Moderator Reflector Can Development for the SRE. J. A. Leppard. *North American Aviation, Inc. (U. S. Atomic Energy Commission)*, NAA-SR-2006, Dec. 1957, 35 p. (UF767 Un3.1na Contin.)

The graphite moderator used in the Sodium Reactor Experiment is sealed against the liquid Na coolant by being enclosed in Zr cans. The development program for these cans is detailed.

5887* Multiple Production of Heavy Particles in Two Nucleon Collisions. V. S. Barashenkov, B. M. Barbashev, E. G. Bubelov, and V. M. Maksimenko. *Nuclear Physics*, v. 5, Jan. 1958, p. 17-22.

The probabilities of particle production in nucleon-nucleon collisions at an energy of $E = 5$ GeV were calculated using Fermi's statistical theory.

5888* The Spectrum of Neutrons From the Reaction p + d → p + p +n. A. T. G. Ferguson and G. C. Morrison. *Nuclear Physics*, v. 5, Jan. 1958, p. 41-46.

The continuous neutron spectrum from the disintegration of deuterium by protons was measured for proton energies of 3.52, 3.72, and 3.92 m.e.v.

5889* Angular Distribution and Linear Polarization of the Gamma Rays From Oriented ^{56}Co Nuclei. A. N. Diddens et al. *Nuclear Physics*, v. 5, Jan. 1958, p. 58-88.

5890* An Analysis of Slow Neutron Resonances in Silver. E. R. Rae, et al. *Nuclear Physics*, v. 5, Jan. 1958, p. 89-121.

The spins, radiation and neutron widths of ten levels in Ag^{108} and Ag^{110} were determined from total, elastic scattering and radiative capture cross sections for slow neutron resonances with Ag.

5891* Beta and Gamma Ray Spectroscopy of Cs^{137}. Yasukazu Yoshizawa. *Nuclear Physics*, v. 5, Jan. 1958, p. 122-140.

5892* The Two-Body Spin-Orbit Interaction. S. M. Vaidya. *Nuclear Physics*, v. 5, Jan. 1958, p. 179-182.

The effect of the inclusion of a two-body spin-orbit interaction is considered for the deuteron. The change in the strengths of the central and the tensor interactions is significant and varies linearly with the strength of the spin orbit interaction.

5893* The Coulomb Excitation of U^{238} and Np^{237} and a Discussion of the Energy Levels of U^{238}. J. O. Newton. *Nuclear Physics*, v. 5, Jan. 1958, p. 218-234.

5894* Some Remarks on K-Meson Decays. S. Oneda and S. Kamefuchi. *Nuclear Physics*, v. 5, Jan. 1958, p. 301-318.

The standpoint that the $K \rightarrow \mu(e) + \nu$ and the $K^{\circ} \rightarrow \pi + \pi$ interactions are the primary weak interactions responsible for all K-meson decays is investigated in detail.

5895* Measurements on Isotope Separated β-Ray Sources of Re^{186} and Re^{188}. K. O. Nielsen and O. B. Nielsen. *Nuclear Physics*, v. 5, Jan. 1958, p. 319-330.

The spectrum of β-rays from Re^{188} to the ground state of Os^{188} was found not to have the allowed shape. The deviations are of the type earlier observed in the decay $Re^{186} \rightarrow Os^{186}$. Both transitions probably proceed from a 1− to a O+ state.

5896* (n,α) and (n,p) Reactions in Fluorine. E. Kondaiah, K. V. K. Iyengar, and C. Badrinathan. *Nuclear Physics*, v. 5, Jan. 1958, p. 346-350.

The ratio of the (n,α) to (n,p) cross-section in F^{19} has been experimentally measured for 14.5 m.e.v. neutrons as 1.2; this ratio has been caculated on the basis of compound nucleus formation to be 3.5. This anomaly is rationalized.

5897* Scattering of Fast Neutrons by Neon-22. C. P. Sikkema, P. J. Pasma, and H. H. Van Barneveld. *Nuclear Physics*, v. 5, Jan. 1958, p. 351-357.

The total cross section of ^{22}Ne shows 10 resonance maxima in this region, viz. at neutron energies of 2.01, 2.14, 2.19, 2.32, 2.53, 2.72, 2.87, 3.10, 3.20, and 3.43 m.e.v.

5898* Dispersion Relations for Weak Interactions. N. N. Bogolubov, S. M. Bilenky, and A. A. Logunov. *Nuclear Physics*, v. 5, Jan. 1958, p. 383-389.

Shows that in processes which involve only weakly interacting but strongly interacting particles also depend only on momentum transfer between strongly interacting particles.

5899* Damping Theory Study of Elastic Scattering of Dirac Particles With Account of Polarization Effects. A. A. Sokolov, B. K. Kerimov, and I. I. Guseinov. *Nuclear Physics*, v. 5, Jan. 1958, p. 390-400.

5900* Ships: Gas-Cooled Reactor is the Choice. Christopher Hinton and R. V. Moore. *Nuclear Power*, v. 3, Jan. 1958, p. 11-16.

Reactors of the graphite-moderated, gas-cooled type can probably be used for the economic propulsion of ships requiring about 25,000 s.h.p. or above, but it is not possible to foresee a reactor system which is likely to be economical in smaller ships.

5901 Aircraft Shield Test Reactor. J. C. Nance and L. W. Perry. *Nucleonics*, v. 16, Jan. 1958, p. 58-61.

Designed to provide aircraft shielding data, it has helped solve other problems, particularly reactor handling.

5902 Plutonium Recycle Test Reactor. R. M. Fryar. *Nucleonics*, v. 16, Jan. 1958, p. 62-63.

5903 Electrical Analog Solves Reactor Design Problems. Shigeo Nagao. *Nucleonics*, v. 16, Jan. 1958, p. 88-90.

A simple method for finding two-dimensional solutions of neutron diffusion equations, thermal conductivity, or the Fermi age equation for geometries of arbitrary complexity.

5904 Boron Steel for Control Rods and Thermal Shields. Nicholas Balai. *Nucleonics*, v. 16, Jan. 1958, p. 100-101.

The advantages of using this material for control rods derive from its ready availability and relatively low cost as compared with Hf.

5905 The Engineering Test Reactor. A Status Report. R. L. Doan. *Nucleonics*, v. 16, Jan. 1958, p. 102-105.

5906* (English.) **An Introduction to the Physics of the New Particles.** C. Franzinetti and G. Morpurgo. *Nuovo Cimento (Supplemento)*, v. 6, ser. 10, no. 2, 1957, p. 469-802 + 15 plates.

Basic properties of K mesons and hyperons; experiments which lead to the determination of these properties. Attempts to interpret the behavior of the new particles. Interaction properties of the new particles; associated production in H and in complex nuclei. Interaction of K^+ and K^-, hyperfragments.

5907* (French.) Effects of the Electrons on the Resonance of Nuclear Spins in Diamagnetic Substances; "Chemical" Displacement and Indirect Interactions. **Influence des électrons sur la résonance des spins nucléaires dans les substances diamagnétiques: le déplacement "chimique" et les interactions indirectes.** A. Abragam. *Nuovo Cimento (Supplemento)*, v. 6, ser. 10, no. 3, 1957, p. 1015-1062.

Displacements of the resonance frequency; indirect coupling between spins. Hamiltonian coupling expression between the electrons, the nuclear spins and the H_0 applied field. Heitler-London approximation. Application of indirect interaction to solid copper acetate.

5908 Minimum Critical Mass and Uniform Thermal Neutron Core Flux in an Experimental Reactor. J. W. Morfitt. *Oak Ridge National Laboratory (U. S. Atomic Energy Commission)*, Y-1023, Dec. 1953, 168 p. (UF767 Un3.1y Contin.)

The relationship between the above has been experimentally investigated in a water-moderated water-reflected nuclear reactor employing U-235 as fuel.

5909 Analysis of Water Activation and Component Shielding for the ORNL Package Reactor Power Plant. W. R. Pearce. *Oak Ridge National Laboratory (U. S. Atomic Energy Commission)*, CF-53-10-168 (Del.), Nov. 1954, 23 p. (UF767 Un3.1cf Contin.)

The activity of primary coolant water in the ORNL Package Power Reactor is estimated for 10-Mw operation and the required thickness of concrete shielding is specified.

5910 Uranium-235 Fission-Product Production as a Function of Thermal Neutron Flux, Irradiation Time, and Decay Time. II. Summations of Individual Chains, Elements, and the Rare-Gas and Rare-Earth Groups. J. O. Blomeke and Mary F. Todd. *Oak Ridge National Laboratory (U. S. Atomic Energy Commission)*, ORNL-2127, Dec. 1957, 354 p. (UF767 U3o Contin.)

Properties of fission product mixtures.

5911 Design and Development of a Fuel Plate Surface Thermocouple for Special Power Excursion Reactor Tests. *Phillips Petroleum Co., Idaho Operations Office (U. S. Atomic Energy Commission)*, IDO-16388, Feb. 1957, 20 p. (UF767 Un3.1id Contin.)

Work on a thermocouple capable of measuring the temperature variation over the range of 20 to 600 C, within the outer 0.001-in. of a thin Al fuel plate is described.

5912 Startup Operation of a Production Facility for Separating Barium-140 From MTR Fuel. B. M. Legler, S. F. Fairbourne, P. N. Kelly, and R. A. Robinson. *Phillips Petroleum Co., Idaho Operations Office (U. S. Atomic Energy Commission)*, IDO-14414, Sept. 1957, 217 p. (UF767 Un3.1id Contin.)

Describes the startup operation of a batch production facility for separating and purifying Ba^{140} from short-cooled MTR fuel.

5913 The SPERT-II Reactor Facility Preliminary Design Report. T. R. Wilson. *Phillips Petroleum Co., Idaho Operations Office (U. S. Atomic Energy Commission)*, IDO-16386, Oct. 1957, 22 p. (UF767 Un3.1id Contin.)

Preliminary design features of one of a series of Special Power Excursion Reactor Test reactors which will be utilized to obtain experimental information on the kinetic behavior of reactors.

5914 MTR Charge Life With Mixtures of U^{235} and Pu^{239}. H. L. McMurry. *Phillips Petroleum Co., Idaho Operations Office (U. S. Atomic Energy Commission)*, IDO-16420, Oct. 1957, 14 p. (UF767 Un3.1id Contin.)

An equation for cycle time of MTR fuel charge containing mixtures of U^{235} and Pu^{239} fuels is presented; role of captures in the resonances at 0.3 e.v. in Pu^{239} and 1 e.v. in Pu^{240} is included.

5915 Summary of the SPERT-I, -II, and -III Reactor Facilities. C. R. Montgomery, J A.. Norberg, and T. R. Wilson. *Phillips Petroleum Co., Idaho Operations Office (U. S. Atomic Energy Commission)*, IDO-16418, Nov. 1957, 34 p. (UF767 Un3.1id Contin.)

5916 High Pressure Water Loop Experiments in the MTR. D. C. King. *Phillips Petroleum Co., Idaho Operations Office (U. S. Atomic Energy Commission)*, IDO-16426, Nov. 1957, 24 p. (UF767 Un3.1id Contin.)

Water loop in the MTR is designed to simulate operating conditions of proposed reactors for the purpose of studying the stability of prototype fuel elements.

5917 Radiative Proton Capture by Ni^{58}, Ni^{60}, and Co^{59}. J. W. Butler and C. R. Gossett. *Physical Review*, v. 108, ser. 2, Dec. 15, 1957. p. 1473-1495.

Thin targets of Ni^{58}, Ni^{60}, and Co^{59} were bombarded with protons from 700 to 1900 k.e.v. Seventeen radiative capture resonances were observed for Ni^{58}, 54 for Ni^{60}, and about 150 for Co^{59}.

5918 Vacuum Polarization Effects in Proton-Proton Scattering. Loyal Durand, III. *Physical Review*, v. 108, ser. 2, Dec. 15, 1957, p. 1597-1610.

Phase shifts caused by the interaction are calculated, and the corresponding addition to the *p-p* scattering matrix is constructed.

5919 Radiative Charge Transfer From H Atoms to He^{2+} Ions. A. M. Arthurs and J. Hyslop. *Physical Society, Proceedings*, v. 70, no. 456A, Dec. 1957, p. 849-856.

The rate coefficient for transfer is calculated at temperatures in the range 250 to 64,000 K. It is found to be almost independent of temperature and to be very high, the mean value being about 1.6×10^{-18} cm^3sec^{-1}.

5920* (Russian.) Use of a Ribbon Lens to Focus the Emitted Cyclotron Beam. **Primenenie lentochnoi linzy dlia fokusirovki vypushchennogo puchka tsiklotrona.** E. S. Mironov, L. M. Nemenov, S. B. Zviagin, and R. A. Meshcherov. *Pribory i Tekhnika Eksperimenta*, 1957, no. 5, Sept.-Oct., p. 18-21.

Details of the construction of an electrostatic focusing system used for vertical focusing of the band of charged particles emitted from a cyclotron and main parameters of this system.

5921 An Energy Principle for Hydromagnetic Stability Problems. I. B. Bernstein, E. A. Frieman, M. D. Kruskal, and R. M. Kulsrud. *Princeton University (U. S. Atomic Energy Commission)*, NYO-7896 (Appendix to NYO-7315), Mar. 1957, 36 p. (UF767 U3ny Contin.)

5922* **Pion-Nucleon Scattering and the Structure of the Pion.** Shigeru Machida. *Progress of Theoretical Physics*, v. 18, Nov. 1957, p. 467-482.

A study of the relation between the effective pion-nucleon interaction Hamiltonian and the nucleon-antinucleon interaction kernel.

5923* **Deuteron Production by Nucleons Bombarding Atomic Nuclei.** Ken Kikuchi. *Progress of Theoretical Physics*, v. 18, Nov. 1957, p. 503-540.

Theoretical considerations. Determination of cross sections and energy spectra.

5924* (German.) Methods of Application of Isotopes in Industry and Engineering. **Isotopenmethoden in Industrie und Technik.** H. Gruber. *Radex Rundschau*, no. 7, Dec. 1957, p. 868-881.

Methods of counting and detecting radiation. Isotopes as radiation sources for industrial measurements and automatic control. Use as tracers in movement of materials and chemical processes; application of radiation effects.

5925 Beam Stacking Experiments in an Electron Model FFAG Accelerator. K. M. Terwilliger, L. W. Jones, and C. H. Pruett. *Review of Scientific Instruments*, v. 28, Dec. 1957, p. 987-997.

The experiments demonstrate the feasibility of "stacking" successively accelerated groups of particles with a density close to that of a single group.

5926 Absolute Determination of Monoenergetic Neutron Flux in the Energy Range 1 to 30 Mev. S. J. Bame, Jr., Eugene Haddad, J. E. Perry, Jr., and R. K. Smith. *Review of Scientific Instruments*, v. 28, Dec. 1957, p. 997-1006.

Fluxes can be measured at neutron energies above one m.e.v. by observing recoil protons scattered at forward angles from a hydrogenous radiator. A counter telescope system for observing the recoil protons is described.

5927 Mass Spectrometer for the Study of Ion-Molecule Collision Processes. G. F. Wells and C. E. Melton. *Review of Scientific Instruments*, v. 28, Dec. 1957, p. 1065-1069.

A pressure ratio of 200 to 1 can be maintained between the ion chamber and the analyzer tube by means of differential pumping.

5928 Slow Collisions Between Heavy Particles. D. R. Bates. *Royal Society, Proceedings*, v. 243, ser. A, Dec. 10, 1957, p. 15-23.

Certain coupling terms neglected in the perturbed stationary state and related approximations for treating slow collisions between heavy particles are discussed.

5929 The Elastic Scattering of Protons by Carbon, Aluminium, Nickel, Copper, Zinc, Niobium, Silver and Gold. G. W. Greenlees, L. Gioietta Kuo, and M. Petravić. *Royal Society, Proceedings*, v. 243, ser. A, Dec. 24, 1957, p. 206-216.

Absolute differential cross-section were measured at 10° intervals for the elastic scattering of protons of energy $9{\cdot}37 \pm 0{\cdot}07$ m.e.v. from these eight elements. In addition, measurements were made for Al at 9·06, 8·86, 8·61, and 8·11 m.e.v.

5930 The Scattering of 9·5 MeV Protons by He, C, N, O, F, Ne, A, Kr, and Xe Nuclei. W. M. Gibson, D. J. Prowse, and J. Rotblat. *Royal Society, Proceedings*, v. 243, ser. A, Dec. 24, 1957, p. 237-251.

A nuclear emulsion method for studying scattering and nuclear reactions of particles from the cyclotron in gaseous targets.

5931* The Determination of the Half-Lives and α-Particle Energies of Some Radioactive Isotopes. I. The Determination of the Half-Lives of Uranium 235 and Uranium 238. II. The Determination of Some α-Particle Energies. F. L. Clark, H. J. Spencer-Palmer, and R. N. Woodward. *South African Chemical Institute, Journal*, v. 10, no. 2, Oct. 1957, p. 62-81.

5932 Theories of Nuclear Moments. R. J. Blin-Stoyle. 89 p. 1957. Oxford University Press, London. (QC794 B61t)

Theories are based on a simplified model of the nucleus. The predictions of such models are compared with the experimental facts and the modifying effects of any meson currents which may occur are considered.

5933* (Norwegian.) Radioactive Fall-Out. Radiochemical Composition and Analysis. **Radioaktivt nedfall. Radiokjemisk sammensetning og analyse.** B. Ottar. *Tidsskrift for Kjemi, Bergvesen og Metallurgi*, v. 17, no. 9, 1957, p. 141-148.

Three forms of fall-out. Activity of the fission products as function of time. Access to man by food. Detection of Cs^{137} and Sr^{90} in water and of I^{131} in milk.

5934 Response of Protective Vaults to Blast Loading. E. Cohen and E. Laing. *U. S. Atomic Energy Commission,* ITR-1451, Nov. 1957, 40 p. (UF767 Un3.1it Contin.)

A reinforced concrete steel-plate-lined vault and steel vault door provided adequate blast and thermoprotection for normal usage at the test incident pressure of 95 psi. and a peak pressure on the door of several times this value.

5935 Conference on Shielding of High-Energy Accelerators, April 11-13, 1957. *U. S. Atomic Energy Commission,* TID-7545, Dec. 1957, 221 p. (UF767 Un3ti)

Papers cover shielding for synchrotrons and shielding computations; design and biological effects of high-energy radiation.

5936 Radiation Damping of an Electron in a Uniform Magnetic Field. Gordon Gibson and Eugene J. Lauer. *University of California, Radiation Laboratory (U. S. Atomic Energy Commission),* UCRL-4942, July 1957, 11 p. (UF767 U3u Contin.)

A pair of differential equations are presented which express the time rate of change of the angle between the momentum vector and the magnetic field vector, and the time rate of change of the energy of the electron.

5937* (German.) Particle Accelerators. **Teilchenbeschleuniger.** Rolf Wideröe. *VDI Zeitschrift,* v. 99, no. 35, Dec. 11, 1957, p. 1743-1754.

Historical background. Definition. Principle of multiple acceleration. Induction accelerators. Linear and circular accelerators. Basic designs; synchrotron; cyclotron; "Lineacs". Possible combinations.

5938* (German.) Absorption of Nuclear Radiation as a Means for Thickness and Density Measurements. **Kernstrahlungsabsorption als Mittel zur Dicken- und Dichtemessung.** Heinrich Fassbender. *VDI Zeitschrift,* v. 100, no. 1, Jan. 1, 1958, p. 17-20.

Changes in the radiation absorption of radioisotopes by testing material were measured by an ionization chamber or Geiger counter, and interpreted through the appropriate indicators.

5939 Absolute Power Calibration of a Flexible Survey Assembly. R. N. Olcott and D. Brown. *Westinghouse Electric Corporation, Atomic Power Division (U. S. Atomic Energy Commission),* WAPD - TM - 74, Aug. 1957, 38 p. (UF767 Un3.1wa Contin.)

Detailed analysis of the various phases for this absolute power calibration so that such an experiment can be performed by any counting laboratory.

5940 Neutron Flux Mapping by Large Detectors. D. R. Harris. *Westinghouse Electric Corporation, Atomic Power Division (U. S. Atomic Energy Commission),* WAPD-TM-91, Oct. 1957, 9 p. (UF767 Un3.1wa Contin.)

In a central region of a large uniform reactor, the neutron flux is so distributed within a good approximation, that large detectors may be employed for accurate measurements of buckling.

5941 Large Counting Losses in Neutron Detection Channels. D. R. Harris. *Westinghouse Electric Corporation, Atomic Power Division (U. S. Atomic Energy Commission),* WAPD-TM-92, Oct. 1957, 10 p. (UF767 Un3.1wa Contin.)

Successive counts are obtained from the experimental channel and from several monitor channels of lower count rates and negligible count losses. The differences between "expected" and measured count rates represent count losses.

5942 PWR Reactivity Accidents. D. H. Jones and M. J. Galper. *Westinghouse Electric Corporation, Atomic Power Division (U. S. Atomic Energy Commission),* WAPD-SC-542, Oct. 1957, 22 p. (UF767 Un3.1wa Contin.)

The reactivity of the PWR is determined primarily by the neutron behavior in the highly enriched seed region of the core. The magnitude of neutron leakage is a function of the effective moderator density in the seed, and this relationship results in a core which displays inherent stability to power fluctuations.

5943* (Russian.) A Study of Radioactivity of Non-Metallic Inclusions in Steel During Electrolysis. **Izuchenie radioaktivnosti nemetallicheskikh vkliuchenii v stali pri elektrolize.** M. I. Tsekhanskii, N. I. Shishkina, and K. B. Khusnoiarov. *Zavodskaia Laboratoriia,* v. 23, no. 12, Dec. 1957, p. 1440-1442.

Degree of impurity of rimmed steel was studied by means of radioisotope Ca^{45}.

5944* (German.) Other Effective Cross-Sectional Areas in Collisions Between Neutral Atoms. **Weitere Wirkungsquerschnitte bei Zusammenstössen zwischen neutralen Atomen.** Hans Pauly. *Zeitschrift für Angewandte Physik,* v. 9, no. 12, Dec. 1957, p. 600-606.

With molecular-ray apparatus of high angular resolution, the over-all effective cross-sections of alkalis were measured against Hg and N.

5945* (Russian.) The Yield and Angular Distribution of Fast Photoneutrons From Deuterium and Carbon. **Vykhod i uglovoe raspredelenie bystrykh fotoneitronov iz deiteriia i ugleroda.** P. S. Baranov, V. I. Gol'danskii, and V. S. Roganov. *Zhurnal Eksperimental'noi i Teoreticheskoi Fiziki,* v. 33, no. 5, Nov. 1957, p. 1123-1130.

The investigation was made on the 265 m.e.v. synchrotron, and the results at proton energies both below and above the threshold for meson production are interpreted in terms of a two-nucleon model.

5946* (Russian.) Deuteron Knock Out From Li, Be, C, and O by 675 m.e.v. Protons. **Vybivanie deitronov iz iader Li, Be, C i O protonami s energiei 675 MeV.** L. S. Azhgirei, et al. *Zhurnal Eksperimental'noi i Teoreticheskoi Fiziki,* v. 33, no. 5, Nov. 1957, p. 1185-1195.

A study of the momentum spectra of charged particles emitted when the bombardment was carried out by magnetic analysis at an angle of 7.6° to the proton beam.

See also: **4707** (radioisotopes in immunological studies); **4767** (algal concentration of Cs^{137}); **4840** (processing of nuclear fuels); **5142** (thermal neutron capture); **5253** (bevatron beam-monitoring systems); **5347** (an eight-decade logarithmic amplifier); **5465** (results from the HASL Sr program); **5587** (use of Be in reactors); **5739** (ETR radiation damage studies); **5759** (fuel element fabrication); **5799** (Al-Th-U liquid fuel); **5848** (radioisotopes applications); **6007** (bubble chambers); **6078** (meteorological factors and reactor safety); **6084** (radioactive effluent disposal); **6165** (applications of isotopes and radiation); **6167** (atomic ship design trends).

OPERATIONS RESEARCH AND MANAGEMENT ENGINEERING

5947* (English.) **A Bibliography on the Theory of Queues.** Alison Doig. *Biometrika,* v. 44, Dec. 1957, p. 490-514.

5948 Decision Making, an Experimental Approach. Donald Davidson, Patrick Suppes, and Sidney Siegel. 121 p. 1957. Stanford University Press, Stanford, Calif. (Q175 D28d)

Problems of empirical interpretation; experimental test of the basic model and of a linear programming model; utilities and incomparable outcomes.

5949* What Can Research Do for Management Problems in Mining? D. Reid Weedon, Jr. *Mining Congress Journal,* v. 44, Jan. 1958, p. 32 + 3 pages.

Suggests several areas where research would be valuable to mining management.

5950 Weapon System Support Activities. Joseph Dressner. *Missiles and Rockets,* v. 3, Jan. 1958, p. 71-73.

An analysis to determine whether the periodic testing, required maintenance, and preuse operational tasks can be performed during the time that will be available and with the equipment, manpower, and facilities that are contemplated. Analysis allows closer approximation to actual field activities.

5951* Balance and Stability in Competitive Situations. Hans E. Quenzer. *Operations Research Society of America, Journal,* v. 5, Dec. 1957, p. 830-840.

The competitive situation is defined by six inputs. Two different measures of effectiveness are developed for the offensive and one for the conservative modes of action.

5952 Problems and Practices in Engineering Management. Elizabeth Marting, editor. 132 p. 1957. American Management Assn., New York. (HD28 Am35s Vis.)

The challenge to management; structure and function of the engineering organization; administering the engineering program; systems engineering.

See also: **5241** (computer applications) .

ORE AND MATERIALS BENEFICIATION

5953* (Russian.) The Influence of Gases on the Flotation of Certain Non-Sulfide Minerals, as Related to Their Crystalline Structure. **Vliianie gazov na flotiruemost' nekotorykh nesul'fidnykh mineralov v zavisimosti ot ikh kristallicheskoi struktury.** V. V. Bakakin, I. N. Plaksin, and E. M. Chaplygina. *Doklady Akademii Nauk SSSR*, v. 116, no. 4, Oct. 1, 1957, p. 625-628.

A description of experiments conducted with fluorite and barite having 0.10 to 0.074 mm. grains.

5954 Dry Concentration of Iron Ore. *Engineering and Mining Journal*, v. 159, Jan. 1958, p. 88-89.

Two new developments, high tension electrostatic separation and a dry magnetic process, brings dry concentration nearer to reality.

5955 Extracting Uranium. *Metal Industry*, v. 92, Jan. 10, 1958, p. 30-32.

Continuous counter-current process utilizes di-(2-ethylhexyl) phosphoric acid and tributyl phosphate dissolved in a high flash-point kerosene to extract U from the leach liquor.

5956* (Russian.) Additional Extraction of Metals From Tailings by Sludge Removal and Flotation. **Doizvlechenie metallov iz otval'nykh khvostov obesshlamlivaniem i flotatsiei.** N. P. Tabakopulo and Iu. A. Tarasov. *Tsvetnye Metally*, v. 30, no. 12, Dec. 1957, p. 1-6.

Repetitive flotation of industrial dump tailings and laboratory analysis of the concentrates. Design of an industrial installation.

5957* (Russian.) Separation of Scandium From Sedimentary Ores, Coal Ash and Certain Minerals With the Aim of Determining and Obtaining the Metal. **Vydelenie skandiia iz osadochnykh rud, zoly uglei i nekotorykh mineralov s tsel' ih ego opedeleniia i polucheniia.** G. Ia. Gornyi. *Ukrainskii Khimicheskii Zhurnal*, v. 23, no. 6, 1957, p. 792-798.

Methods developed were: combined oxalate-phytate determination of Sc in silicate minerals and rocks having low Ti concentration; coprecipitation of Sc and Ti in coal ash, and Ti containing rocks and minerals; and purification of Sc phytate from Th, Ti, and other elements.

See also: **5633** (beneficiation of Co and Ni ores); **5650** (properties of fluxed iron ore sinter).

PHYSICS

5958 Acoustical Field at Normal Modes in Rooms. T. S. Korn and R. Van de Plas. *Acoustical Society of America, Journal*, v. 29, Dec. 1957, p. 1267-1270.

The physical form of the above can be represented as a set of elementary curvilinear ducts, each carrying a single stationary wave, satisfying individually the boundary conditions at the walls.

5959 Design and Performance of a New Reverberation Room at Armour Research Foundation, Chicago, Illinois. D. R. McAuliffe. *Acoustical Society of America, Journal*, v. 29, Dec. 1957, p. 1270-1273.

Data are presented for the room which has a volume of approximately 3000 cu. ft. and a reverberation time of about 5 sec.

5960 Threshold of Hearing and Equal-Loudness Relations of Pure Tones, and the Loudness Function. D. W. Robinson and R. S. Dadson. *Acoustical Society of America, Journal*, v. 29, Dec. 1957, p. 1284-1288.

5961 Some Impedance Measurements on Normal and Pathological Ears. J. Zwislocki. *Acoustical Society of America, Journal*, v. 29, Dec. 1957, p. 1312-1317.

Shows that otosclerosis and the interruption of the ossicular chain can be easily detected by means of the impedance measurement. An electrical and mathematical model of the dynamics of the middle ear is developed.

5962 Analysis of a Multiple Receiver Correlation System. Melvin J. Jacobson. *Acoustical Society of America, Journal*, v. 29, Dec. 1957, p. 1342-1347.

A theoretical study is made of an acoustic receiving system which contains a single correlator whose inputs are obtained from arrays of omni-directional receivers.

5963 Active, Adjustable Audio Band-Pass Filter. J. Ross MacDonald. *Acoustical Society of America, Journal*, v. 29, Dec. 1957, p. 1348-1356.

An active, adjustable band-pass filter having seventh-order Butterworth attenuation characteristics (42 db/octave slopes) is described.

5964 Propagation of Nonaxially Symmetric Waves in Elastic Cylindrical Shells. R. M. Cooper and P. M. Naghdi. *Acoustical Society of America, Journal*, v. 29, Dec. 1957, p. 1365-1373.

5965* (German.) A Contribution to the Theory of Relativistically Constant Spin Wave Equations. **Zur Theorie relativistisch invarianter Spinwellengleichungen. I - II.** Hermann Donnert. *Acta Physica Austriaca*, v. 11, no. 3, 1957, p. 321-376.

Discusses equations for particles free of forces with a finite rest mass and with any half complete spin. The theory is constant relatively to the transformations of the complete Lorentz group. Validity of the relativistic energy-impulse relationship.

5966* Effect of Roentgen-Ray Quality on Response in Xeroradiography. George C. Henny. *American Journal of Roentgenology, Radium Therapy and Nuclear Medicine*, v. 79, Jan. 1958, p. 158.

5967* A Projection Roentgen - Ray Microscope Using Electrostatic Lenses. E. Dale Trout, John P. Kelley, and Arthur C. Lucas. *American Journal of Roentgenology, Radium Therapy and Nuclear Medicine*, v. 79, Jan. 1958, p. 159-162.

5968 The Viscosity of Liquid Helium at Frequencies of 11.8 and 35.5 kc./sec. K. M. Eisele and A. C. Hollis Hallett. *Canadian Journal of Physics*, v. 36, Jan. 1958, p. 25-34.

A solid cylinder set into torsional oscillation at its natural frequency was used to measure the viscosity of liquid He in the range 4.2 to 1.2 K.

5969* (French.) Luminescence of Benzene and Hexadeuterobenzene at 20 K. **Luminescence du benzene et de l'hexadeutérobenzène à 20°K.** Adnan Zmerli. *Comptes Rendus*, v. 245, no. 22, Nov. 25, 1957, p. 1911-1913.

Vibration levels of the excited states were used to explain the vibration structure of the phosphorescence spectra of benzene at 20 K, which might be due to the photochemical action of O.

5970 (French.) Dislocations. **Les dislocations.** J. Friedel. 314 p. 1956. Gauthier-Villars, Paris. (QD931 F91d)

A textbook for students and research engineers on dislocation in crystals. General properties. Elastic theory, displacement, imperfect dislocations. Crystal growth. Effect of cold work and impurities. Polygonization. Interaction of dislocations with other defects.

5971* (Russian.) Fluorescence Spectra and Fluorescence Action Spectra of Some Proteins. **Spektry fluorestsentsii i spektry deistviia fluorestsentsii nekotorykh belkov.** S. V. Konev. *Doklady Akademii Nauk SSSR*, v. 116, no. 4, Oct. 1, 1957, p. 594-597.

Study of the centers which are responsible for the fluorescence of albumin, and possibilities of intermolecular energy migration in albumin and nucleoprotein.

5972* Design Advances From Magnetism Research. William Arrott. *Electrical Manufacturing*, v. 61, Jan. 1958, p. 86 + 15 pages.

Recent developments in: soft magnetic alloys for power applications; permanent magnet design; thin magnetic films and other elements for computer memory devices; ferrites, garnets, microwave techniques, and magneto-optics.

5973 Energy Transfer and Sensitization in Single Crystal Phosphors. R. Leach. *Electrochemical Society, Journal,* v. 105, Jan. 1958, p. 27-33.

Investigations, showing that CaF_2 activated with Ce and Mn forms a sensitized phosphor of high efficiency, are confirmed by measurements on activated single crystals.

5974 The Calcium-Silicate-Tungstate Phosphor. Phase Relationships and Fluorescent Properties. D. E. Harrison and F. A. Hummel. *Electrochemical Society, Journal,* v. 105, Jan. 1958, p. 34-37.

5975 The Calcium-Silicate-Tungstate Phosphor. Preparation and Physical Properties. Shannon Jones. *Electrochemical Society, Journal,* v. 105, Jan. 1958, p. 37-40.

5976 A Mechanical and Thermodynamical Theory of Non-Linear Relaxation Behaviour of Solids. H. C. Brinkman and F. Schwarzl. *Faraday Society, Discussions,* no. 23, 1957, p. 11-18. (TK1 F22d Vis.)

Describes relaxation as a diffusion process of molecular groups over potential barriers. Mechanical and thermodynamical properties resulting from this model are calculated. Theory relates deviations from linearity to properties of the potential holes and barriers in which the diffusion process takes place.

5977 Dielectric Relaxation Processes in Lithium, Sodium and Potassium Halides. J. S. Dryden and R. J. Meakins. *Faraday Society, Discussions,* no. 23, 1957, p. 39-49. (TK1 F22d Vis.)

Dielectric properties of halides containing divalent cation impurity were studied at frequencies and temperature where relaxation absorption curves are clearly separate from the background loss due to d.c. conductivity. In several cases two distinct absorptions were observed.

5978 Dielectric Loss in Insulating Solids Caused by Impurities and Colour Centres. J. Volger. *Faraday Society, Discussions,* no. 23, 1957, p. 63-71. (TK1 F22d Vis.)

Experiments at low temperatures on solids with various lattice defects have revealed the existence of dielectric relaxation phenomena.

5979 Point Defects Produced by Irradiation and Their Annealing in Ionic and Covalent Crystals. F. P. Clarke. *Faraday Society, Discussions,* no. 23, 1957, p. 141-154. (TK1 F33d Vis.)

Diffusion of defects to normal lattice positions may be described mathematically, using as basis a simple physical model which is in accord with certain experimental data.

5980 Ferroelectricity in Crystals. Helen D. Megaw. 220 p. 1957. Methuen & Co., Ltd., London. (QD939 M47f)

Structure and properties of known ferroelectric and antiferroelectric materials. Various theories of ferroelectricity.

5981* (Italian.) Infra-Red Spectrum of Methyl Copper. **Spettro infraosso del rame metile.** Giacomo Costa and Giancarlo De Alti. *Gazzetta Chimica Italiana,* v. 87, no. 11, Nov. 1957, p. 1273-1280.

The preparation allowed a complete elimination of the organic solvents from the sample and the absorption bands from the spectrum. Tetrahedral structure of the isolated molecule. Interactions of the molecules in the solid state.

5982* Spectral Luminosity of Fluorescent Lamps. Charles W. Jerome. *Illuminating Engineering,* v. 53, Jan. 1958, p. 41-46.

Explains basic principles involved in the computation of brightness from spectral energy curves and shows results for the usual fluorescent lamp colors.

5983* (Russian.) Determining Density Distribution of Electronic States According to Energies From X-Ray Spectra. **K voprosu o nakhozhdenii po rentgenovskim spektram raspredeleniia plotnosti eletronnykh sostoianii po energiiam.** I. Ia. Nikiforov. *Izvestiia Akademii Nauk SSSR, Seriia Fizicheskaia,* v. 21, no. 10, Oct. 1957, p. 1362-1366.

5984* (Russian.) The Effect of Activator on the X-Ray Absorption Spectrum of the Luminescent Crystal. **O vliianii aktivatora na rentgenovskii spektr pogloshcheniia liuminestsentnogo kristalla.** K. I. Narbutt and I. S. Smirnova. *Izvestiia Akademii Nauk SSSR, Seriia Fizicheskaia,* v. 21, no. 10, Oct. 1957, p. 1367-1374.

Effect of NaI and CsI crystals revealing the presence of additional absorption maxima, the energy of which corresponds to the transfer of electrons on a local level.

5985* (Russian.) Some Aspects of the Spectral Analysis Problem of Light-Diffusing Media, and Reflectivity of Dyed Polydispersed Material. **Nekotorye aspekty zadachi o spektral'nom analize svetorasseivaiushchikh sred i otrazhatel'naia sposobnost' okrashennykh polidispersnykh veshchestv.** G. V. Rosenberg. *Izvestiia Akademii Nauk SSSR, Seriia Fizicheskaia,* v. 21, no. 11, Nov. 1957, p. 1473-1484.

Difficulties encountered in analysis of the dispersed substances. Theoretical investigation and discussion.

5986* (Russian.) The Main Problems of Diffused Media Spectroscopy. **Osnovnye problemy spektroskopii rasseivaiushchikh sred.** B. I. Stepanov. *Izvestiia Akademii Nauk SSSR, Seriia Fizicheskaia,* v. 21, no. 11, Nov. 1957, p. 1485-1493.

Review of works on spectroscopy of dispersed media.

5987 Formation of Negative Ions in Gases by Secondary Collision Processes. E. E. Muschlitz, Jr. *Journal of Applied Physics,* v. 28, Dec. 1957, p. 1414-1418.

Experiments on the formation of negative ions by electron bombardment of H, O, and water vapor at pressures of 0-4 mm. show the only ion in H is H^-, formed by dissociative attachment. Data on the formation of O^- and O_2^- at low electron energies are also presented.

5988 Explosive Induced Shock Waves. I. Plane Shock Waves. William E. Drummond. *Journal of Applied Physics,* v. 28, Dec. 1957, p. 1437-1441.

Production of plane shock waves in solids is analyzed in the approximation that third and higher order terms in the shock strength can be neglected, and a procedure is developed for calculating the attenuation of the shocks.

5989* (French.) Corpuscular Representation of the Vector Field, and Comparison With the Field of Maximum Spin 1 of the Fusion Theory. **Représentation corpusculaire du champ vectoriel et comparaison au champ de spin maximum 1 de la théorie de fusion.** K. H. Tzou. *Journal de Physique et le Radium,* v. 18, Nov. 1957, p. 619-624.

Analysis of spin states of particles. Application to energy levels of Np-237.

5990* (French.) Optical and Dielectric Study of Boracite. **Étude optique et diélectrique de la Boracite.** Yves Le Corre. *Journal de Physique et le Radium,* v. 18, Nov. 1957, p. 629-631. Sensitivity to an electric field, variation of the dielectric constant with temperature, and the hysteresis cycle were observed in $Mg_3B_7O_{13}Cl$.

5991 The Hall-Effect Compass. I. M. Ross, E. W. Saker, and N. A. C. Thompson. *Journal of Scientific Instruments,* v. 34, Dec. 1957, p. 479-484.

Recent work on semi-conductors has led to materials in which the Hall effect in the earth's magnetic field is strong enough to form the basis of a simple electrical compass.

5992 Experiments Using a Simple Thermal Comparator for Measurement of Thermal Conductivity, Surface Roughness and Thickness of Foils or of Surface Deposits. R. W. Powell. *Journal of Scientific Instruments,* v. 34, Dec. 1957, p. 485-492.

5993 A Tunable Infra-Red Interference Filter. S. D. Smith and O. S. Heavens. *Journal of Scientific Instruments,* v. 34, Dec. 1957, p. 492-496.

An infra-red Fabry-Pérot interferometer working at very low orders as a tunable narrow band interference filter is described. The high reflecting surfaces are provided by germanium/cryolite quarter-wave stacks and the air gap between the surfaces may be varied to change the wavelength passed by the filter.

5994* (Hungarian.) Calorimetric Determination of the Degree of Effectiveness of ZnS Type Luminescent Materials. **ZNS-típusú lumineszkáló anyagok hatásfokának kaloriméteres meghatározása.** Gy. Gergely. *Magyar Fizikai Folyóirat*, v. 5, no. 5, 1957, p. 423-426.

Improvement and further development of Bodó apparatus by the use of thermistors and an ultra-thermostat.

5995* (German.) Light Modulation Through the Static Waves in Liquids. **Lichtmodulation durch stehende Wellen in Flüssigkeiten.** H. F. Reimann. *Nachrichtentechnik*, v. 7, no. 11, Nov. 1957, p. 515-518.

Basic principles of the H.F. modulation of light.

5996* (English.) **Paramagnetism in Crystals.** M. H. L. Pryce. *Nuovo Cimento (Supplemento)*, v. 6, ser. 10, no. 3, 1957, p. 817-856.

Types of magnetism. Basic laws and Langevin theory. Quantum theory of paramagnetism. Crystal field. Magnetic moment. Paramagnetic resonance. Hamiltonian spin. D-state and S-state ions. Ions of the rare earths. Hyperfine structure.

5997* (French.) The Optical Methods of Hertzian Resonance. **Les méthodes optiques de la résonance hertzienne.** A. Kastler. *Nuovo Cimento (Supplemento)*, v. 6, ser. 10, no. 3, 1957, p. 1148-1167.

Zeeman resonances of optically excited states. Magnetic resonance curves and multiple photon diffusion. Resonances of atomic excited states and determination of the electric quadrupolar moments of the nuclei. Atom orientation by optical process.

5998 Energy Transfers Between Crystals and Adsorbed Dyes. I. Densensitization. R. C. Nelson. *Optical Society of America, Journal*, v. 48, Jan. 1958, p. 1-3.

The electron affinities of several desensitizing dyes were found to lie in the neighborhood of 3.5 e.v. The dyes produced a desensitization of photoconductivity in CdS films, indicating that they acn serve as surface electron traps.

5999 New Lines in the Spectra of Zirconium. William E. W. Howe. *Optical Society of America, Journal*, v. 48, Jan. 1958, p. 28-30.

Two-hundred twenty-four new atomic Zr lines are found in the region between 6100 and 6500 A.

6000 Electroluminescence and Image Intensification. G. Diemer, H. A. Klasens, and P. Zalm. *Philips Technical Review*, v. 19, no. 1, 1957-1958, p. 1-11.

Construction and general behavior of a luminous panel; mechanism of electroluminescence; fabrication of panel; emittance and efficiency.

6001* (English.) **Lifetime Measurements of Minority Carriers Across and Along a Dislocation Wall in a Germanium Crystal.** Ryukiti R. Hasiguti and Etsuyuki Matsuura. *Physical Society of Japan, Journal*, v. 12, no. 12, Dec. 1957, p. 1347-1351.

The spacing of dislocations in the wall was about 2×10^{-4} cm. Recombination diameter of a dislocation in the wall was 2.2×10^{-5} cm. The lifetime was unusually large when measured along the wall. It appears that the wall forms a *p*-type thin layer in an *n*-type crystal.

6002* (English.) **Structural Investigation by Means of Nuclear Quadrupole Resonance. III. (Arsenic Tribromide).** Kenji Shimomura. *Physical Society of Japan, Journal*, v. 12, no. 12, Dec. 1957, p. 1386-1393.

The structure of $AsBr_3$ is investigated at about 10 C and is compared with Braekken's results of X-ray analysis.

6003* (English.) **On the Viscoelasticity and Complex Dielectric Constant in the Presence of an Electric Field and a Shearing Laminar Flow in Solution of Macromolecules.** Nobuhiko Saitô and Tomokazu Kato. *Physical Society of Japan, Journal*, v. 12, no. 12, Dec. 1957, p. 1393-1402.

The intrinsic viscosity increases proportionally to the square of the applied electric field, and the dielectric constant increases proportionally to the square of the velocity gradient.

6004* On a Theory of Shock Waves in Locally Supersonic Zone and a New Boundary-Value Problem for Tricomi's Equation. Shunichi Tsugé. *Physical Society of Japan, Journal*, v. 12, no. 12, Dec. 1957, p. 1412-1419.

6005 The Decay of the Nitrogen Afterglow. J. M. Anderson, A. D. Kavadas, and R. W. McKay. *Physical Society, Proceedings*, v. 70, no. 456A, Dec. 1957, p. 877-886.

Accurate measurements of the decay of intensity of the N afterglow were made over a range of intensity greater than 10^6 to one. Series of observations are recorded for independent variation of temperature, pressure, and O impurity.

6006 The Physical and Thermodynamic Properties of Helium. Jesse T. Simmons. Sections individually paged. 1957. Wm. R. Whittaker Co., Ltd., Calif. (QD181.H4 Si47p Over.)

The reported property values cover the pressure range of 14.7 to 6000 psi.a. and the temperature range of −440 to 600 F.

6007 Proceedings of the 1956 Cryogenic Engineering Conference. K. D. Timmerhaus, editor. 369 p. 1957. University of Colorado, Boulder. (QC278 C88p)

Papers deal with cryogenic processes, equipment, and properties, also bubble chambers.

6008* Some Conduction Problems in the Heating of Small Areas on Large Solids. P. H. Thomas. *Quarterly Journal of Mechanics and Applied Mathematics*, v. 10, Nov. 1957, p. 482-493.

The variation with time of surface temperature of the center of the heated area on a semi-infinite solid has been computed for various sizes of areas and degrees of cooling.

6009 Some Properties of Crystal Lattices. M. A. Jaswon. *Research*, v. 11, Jan. 1958, p. 26-32.

An analysis of the arrangement of lattice points in lattice planes and of the plane stacking properties. Theory applies to the study of twinned crystals.

6010 New Technique for Measuring Rotational Hysteresis in Ferromagnetic Materials. Joseph M. Kelly, Jr. *Review of Scientific Instruments*, v. 28, Dec. 1957, p. 1038-1040.

Technique covers losses over the frequency range 3 to 30 c.p.s.

6011* (French.) A Contribution to the Study of Binocular Space Vision. **Contribution a l'étude de la vision binoculaire de l'espace.** Clotilde Bourdy. *Revue d'Optique*, v. 36, no. 10, Oct. 1957, p. 449-475.

Binocular convergence in nocturnal vision. Variations according to the test field dimensions or distance. Heterophoria and a metropia. Night myopia. Other cases of convergence. (To be continued.)

6012* The Angular Acceleration of Liquid Helium II. H. E. Hall. *Royal Society of London, Philosophical Transactions*, v. 250, ser. A, no. 980, Dec. 12, 1957, p. 359-385 + 1 plate.

Direct measurements were made of the torques required to produce angular acceleration and retardation of liquid He II contained in a can filled with closely spaced disks at 1.27 K.

6013 The Etching of Crystal Cleavages. I. Mica. II. Diamond Octahedral Cleavages. A. R. Patel and S. Tolansky. *Royal Society, Proceedings*, v. 243, ser. A, Dec. 10, 1957, p. 33-47 + 7 plates.

Two types of etch pits are found: small widely distributed pits and relatively large localized isolated pits. It is established that cleavage lines are displaced by the etching. Etch pits are distributed in three ways: random small pits, striking linear arrangements, and individual isolated pits usually larger than the others.

6014 On Schwinger's Variational Principle. T. W. B. Kibble and J. C. Polkinghorne. *Royal Society, Proceedings*, v. 243, ser. A, Dec. 24, 1957, p. 252-263.

The classical and quantum theories of dynamical systems whose Lagrangians are linear in the co-ordinate derivatives are studied.

6015 A Variational Method for Calculating Magnetic Shielding Constants in Molecules. M. J. Stephen. *Royal Society, Proceedings*, v. 243, ser. A, Dec. 24, 1957, p. 264-273.

Using approximate variation functions together with simple molecular-orbit and valence-bond wave functions, calculations were made for the molecules H, CH_4, C_2H_4, and C_2H_2.

6016 A Variational Method for Calculating Nuclear Spin-Spin Interactions in Molecules. M. J. Stephen. *Royal Society, Proceedings*, v. 243, ser. A, Dec. 24, 1957, p. 274-280.

A general variation method is developed for determining: the magnetic shielding of nuclear spin-spin interactions and electron-coupled nuclear spin-spin interactions in molecules.

6017 Simple Solutions of the Partial Differential Equation for Diffusion (or Heat Conduction). S. C. Jain. *Royal Society, Proceedings*, v. 243, ser. A, Jan. 14, 1958, p. 359-374.

Simple approximate solutions for diffusion in finite solids of various shapes and conditions can be derived from the simple solutions which are rigorously applicable to linear diffusion in a semi-infinite slab.

6018 Strong Magnetic Fields. Harold P. Furth, Morton A. Levine, and Ralph W. Waniek. *Scientific American*, v. 198, Feb. 1958, p. 28-33.

Electromagnets whose fields compare with TNT in their concentration of energy. The resulting forces can explode the massive metal coils which produce them.

6019 Solid State Physics. Advances in Research and Applications. Frederick Seitz and David Turnbull, editors. v. V. 455 p. 1957. Academic Press, New York. (QC125 So44)

Galvanomagnetic and thermomagnetic effects in metals; luminescence in solids; space groups and their representations; shallow impurity states in Si and Ge; quadrupole effects in nuclear magnetic resonance studies of solids.

6020 Symposium on Thermal Conductivity Measurements and Applications of Thermal Insulations, 1957. 86 p. American Society for Testing Materials, Philadelphia. (TH1715 Am35s)

Guarded hot plate thermal conductivity apparatus. Thermal conductivity of insulation containing moisture. Criteria for thermal insulation for use on underground piping.

6021* (Russian.) Electron Paramagnetic Resonance. **Elektronnyi paramagnitnyi rezonans.** S. A. Al'tshuler and B. M. Kozyrev. *Uspekhi Fizicheskikh Nauk*, v. 63, no. 3, Nov. 1957, p. 533-573.

Theoretical and experimental studies of the following groups of substances: ionic crystals, electrolyte solutions, and free radicals.

6022* (Russian.) Excitation Spectrum of Excitons in Crystal Lattice. **Spektr vozbuzhdeniia eksitonov v kristallicheskoi reshetke.** E. F. Gross. *Uspekhi Fizicheskikh Nauk*, v. 63, no. 3, Nov. 1957, p. 575-611.

Survey of the works in this field up to 1956.

6023* (Russian.) Correlation Theory of Electric Fluctuations and Heat Radiation. **Korreliatsionnaia teoriia elektricheskikh fluktuatsii i teplovogo izlucheniia.** S. M. Rytov. *Uspekhi Fizicheskikh Nauk*, v. 63, no. 4, Dec. 1957, p. 657-672.

Survey of works and accomplishments in this field.

6024* (Russian.) Structure of the Fused Silicates. **O stroenii rasplavlennykh silikatov.** O. A. Esin. *Uspekhi Khimii*, v. 26, no. 12, Dec. 1957, p. 1374-1387.

Distribution and electronic properties of atomic anions were studied.

6025* (German.) Conductive Mechanism of the CdS-Sandwich Cell. **Zum Leitungsmechanismus von CdS-Sandwichzellen.** G. Ecker and J. Fassbender. *Zeitschrift für Physik*, v. 149, no. 5, 1957, p. 571-582.

On the basis of known examples of the photoconductivity of semiconductors, a theory for CdS-sandwich cells is developed.

See also: **5154** (vapor pressure of curved surfaces); **5251** (crystal structure determination); **5907** (electrons and nuclear spins in diamagnetic substances).

PLASTICS

6026* Stretched Acrylic. A Transparent Glazing Material for High-Speed Aircraft. John G. Stansbury. *Aeronautical Engineering Review*, v. 17, Jan. 1958, p. 42 + 5 pages.

Improved shatter and craze resistance at reduced weight and simplification of edge attachment design are made possible by stretched acrylic glazing.

6027 Brittleness in Polyethylene. I. L. Hopkins. *Bell Laboratories Record*, v. 36, Jan. 1958, p. 5-8.

A biaxial elongation test and other experimental work showed that cable sheaths were improved by specifying polyethylenes of higher mol. wt.

6028* (Russian.) The Effect of Perchlorates on Styrene Polymerization. **Vliianie khlornokislykh solei na polimerizatsiiu stirola.** B. I. Losev and Iu. I. Zakharova. *Doklady Akademii Nauk SSSR*, v. 116, no. 4, Oct. 1, 1957, p. 609-612.

The catalytic effect of K, NH_4, Ba, and Mg perchlorate on styrene polymerization at 20 to 90 C was studied. With Mg perchlorate the rate of polymerization is proportional to the concentration of $Mg(ClO_4)_2$ when its content is more than 0.125 mole/mole of styrene.

6029* Irradiated Polyethylene Insulation Systems. Kenneth J. Mackenzie and Robert A. Ward. *Electrical Manufacturing*, v. 61, Jan. 1958, p. 56-61.

Electrical characteristics of electron-irradiated polyethylene are evaluated for application in wire and cable and motor and generator insulation systems.

6030* Foamed Plastics for Structural Functions in Electronic Equipment. Russell Thielman. *Electrical Manufacturing*, v. 61, Jan. 1958, p. 67-73.

Sandwich-type elements made of foamed plastics, can be used for such mechanical elements as mounting plates to help equipment withstand severe vibration conditions as well as other severe environments encountered in airborne service.

6031 Theory of Chain-End Activated Degradation of Heterodisperse Polymers. Manfred Gordon. *Faraday Society, Transactions*, v. 53, Dec. 1957, p. 1662-1675.

6032* (German.) Catalysis of Polyester Formation by Ester Exchange. **Zur Katalyse der Polyesterbildung durch Esteraustausch.** Wolfgang Griehl and Günther Schnock. *Faserforschung und Textiltechnik*, v. 8, no. 10, Oct. 1957, p. 408-416.

After a detailed examination of the so-called pre-condensation of the polyethylene terephthalate formation, the polyester formation, proceeding as ester exchange, is studied.

6033 High Molecular Weight Polymers of Ethylene Oxide. Polymerization With Alkaline Earth Carbonate Catalysts. F. N. Hill, F. E. Bailey, Jr., and J. T. Fitzpatrick. *Industrial and Engineering Chemistry*, v. 50, Jan. 1958, p. 5-7.

Strontium carbonates are especially effective in speeding manufacture of these water-soluble polymers.

6034 High Molecular Weight Polymers of Ethylene Oxide. Plastic Properties. Keith L. Smith and Russell Van Cleve. *Industrial and Engineering Chemistry*, v. 50, Jan. 1958, p. 12-16.

Plastic properties of poly(ethylene oxide), in both solid and molten states.

6035* (French.) Structure and Viscoelastic Properties of Thermoplastic Materials. **Structure et propriétés viscoélastiques des matières thermoplastiques.** A. Rodeyns. *Industrie Chimique Belge*, v. 22, no. 11, Nov. 1957, p. 1275-1286.

Mechanical behavior as conditioned by macromolecular structure. Elasticity modulus of amorphous materials decreases when the duration of exterior forces increases. Behavior of crystalline and of crossed-linked materials.

6036* (English.) **New Thermoplastic Polyesters.** André Conix. *Industrie Chimique Belge*, v. 22, no. 12, Dec. 1957, p. 1457-1462.

Synthesis and properties of polyesters derived from 4,4'-dihydroxy-diphenyl alkanes and aromatic dibasic acids or from unsaturated aliphatic dicarboxylic acids. Their high softening points and solubility in volatile organic solvents are of interest.

6037* New Developments and Techniques of Sawing and Machining Glass Reinforced Plastics. Lee H. Barron. *Insulation*, v. 4, Jan. 1958, p. 14-17.

Types of diamond tools; band sawing; sawing and grinding; automation and tool wear.

6038 Preparation of 'High-*Ortho*' Novolak Resins. I. Metal Ion Catalysis and Orientation Effect. D. A. Fraser, R. W. Hall, and A. L. J. Raum. **II. The Course of the Reaction.** D. A. Fraser, R. W. Hall, P. A. Jenkins, and A. L. J. Raum. *Journal of Applied Chemistry*, v. 7, Dec. 1957, p. 676-700.

6039 (French.) Radiochemical Degradation of High Polymers in Solution. **Dégradation radiochimique des hauts polymères en solution. II.** A Study of the Degradation by γ-Rays and of Protracted Effetcs in the Polystyrene-Chloroform-Air System. **Étude de la dégradation par les rayons γ et des effets prolongés dans le système polystyrolène-chloroforme-air.** Jean Durup. *Journal de Chimie Physique*, v. 54, no. 10, Oct. 1957, p. 739-752.

A viscosimeter study of the degradation of dilute solutions of polystyrlene in $CHCl_3$ under the effect of γ rays of Co-60 in the absence and presence of air. Chemical yields of reactions. Slow decomposition of peroxides accumulating during irradiation. A mechanism was discussed for degradation.

6040 Mechanical Degradation and Cross Linking of Polymers by Plastic Deformation at High Pressure. H. A. Larsen and H. G. Drickamer. *Journal of Physical Chemistry*, v. 61, Dec. 1957, p. 1643-1646.

During plastic deformation at high pressure sufficient mechanical force is applied to long polymer molecules to cause homolytic rupture of covalent -C-C- bonds. Insoluble gel is produced during this process with polystyrene, poly-α-methylstyrene and *cis*-1,4-polyisoprene. Degradation only is noted for others.

6041* Effect of Gamma-Radiation on Cellulose. R. E. Glegg and Z. I. Kertesz. *Journal of Polymer Science*, v. 26, Dec. 1957, p. 289-297.

A study of model systems of cellulose was undertaken to determine the degradation caused by γ-radiation in the dosage range known to affect the texture of fruits and vegetables.

6042* Anionic Polymerization of α-Methylstyrene. D. J. Worsfold and S. Bywater. *Journal of Polymer Science*, v. 26, Dec. 1957, p. 299-304.

The polymerization of α-methylstyrene catalyzed by sodium naphthalene has been studied below zero C. Measurable amounts of monomer remained in equilibrium with the polymer down to −40 C even though active chain ends were still present.

6043* Molecular Orbital Theory of Reactivity in Ionic Polymerizations. T. Yonezawa, et al. *Journal of Polymer Science*, v. 26, Dec. 1957, p. 311-321.

Stabilization energy and monomer reactivity ratios; ionic homopolymerization.

6044* Controlled Boron Trifluoride Catalysis of Epoxy Polymerizations. Herman B. Wagner. *Journal of Polymer Science*, v. 26, Dec. 1957, p. 329-332.

The destructive exotherm that ordinarily accompanies contact of BF_3 with epoxy compounds is avoided by gradual release of the catalyst. Control is accomplished through use of the liquid BF_3-ethyl ether complex absorbed on a particulate carrier, the particles being coated with a paraffin barrier layer.

6045* Dynamic Viscosity and Shear Modulus of Molten Polystyrene as a Function of Molecular Weight. W. P. Cox, L. E. Nielsen, and R. Keeney. *Journal of Polymer Science*, v. 26, Dec. 1957, p. 365-374.

6046 Plastics for Focusing Collectors. J. A. Duffie, R. P. Lappala, and G. O. G. Lof. *Journal of Solar Energy Science and Engineering*, v. 1, Oct. 1957, p. 9-13.

Polystyrene shells with aluminized Mylar reflective linging have been the most promising of the sunlight-reflecting materials considered.

6047* (Russian.) On the Selection of Plasticizers for High Polymers. **O podbore plastfikatorov dlia vysokopolimerov.** S. P. Papkov. *Kolloidnyi Zhurnal*, v. 19, no. 6, Nov.-Dec. 1957, p. 722-729.

The choice of a definite plasticizer and the amount to be added are determined by the nature of the family of isoviscosity curves and the position of the phase equilibrium curve on the composition-temperature diagram.

6048* (German.) Internal Stresses in PVC Cable Insulation. **Innere Spannungen in PVC-Isolierungen.** F. O. Glander. *Kunststoffe*, v. 47, no. 12, Dec. 1957, p. 678-682.

The influence of forming temperature of gelled plasticized PVC compounds on the mechanical properties of the end products, considering conditions prevailing during the sheathing of metallic conductors.

6049* (German.) The Properties of PVC Paste Resins. **Über die Eigenschaften pastenbildender PVC-Sorten.** Drahomir Ryšavý. *Kunststoffe*, v. 47, no. 12, Dec. 1957, p. 683-685.

The resistance of different types of PVC to the solvent effect of plasticizers. The chief factor influencing the rate of dissolution of PVC is the size of the contact area between the polymer and the plasticizer.

6050* (German.) The Condensation of Melamine and Formaldehyde at Controlled pH. **Über die Kondensation von Melamin mit Formaldehyd unter spezieller Berücksichtigung des pH- Verlaufs während der Reaktion.** Horst Michaud. *Kunststoffe*, v. 47, no. 12, Dec. 1957, p. 686-689.

A study of factors influencing the rate of condensation.

6051* (German.) Kinetics of the Setting of Epoxy Resins. **Zur Kinetik der Härtung von Epoxyd-Harzen.** Günter Kannebley. *Kunststoffe*, v. 47, no. 12, Dec. 1957, p. 693-696.

6052 Polypropylene—A Promising New Plastic. C. Crespi. *Materials in Design Engineering*, v. 47, Jan. 1958, p. 110-114.

Properties, fabricating characteristics, and potential applications of a new heat resistant thermoplastic material.

6053 Molding Shrinkage and Related Effects in a Fixed-Cavity Compression Mold. I. W. R. McGlone and L. B. Keller. *Modern Plastics*, v. 35, Feb. 1958, p. 125 + 8 pages.

Shrinkage components both in the force direction and normal to it were measured as functions of molding conditions and material characteristics.

6054 'Formolding' Acrylic Sheet. *Modern Plastics*, v. 35, Feb. 1958, p. 137 + 2 pages.

Dry acrylic sheets, preferably straight from the extruder, are heated to 390 F, then formed by compression in 200 F mold to give thin-walled parts that would be difficult to injection mold.

6055 Measurement of Stresses in Cast Resins. A. J. Bush. *Modern Plastics*, v. 35, Feb. 1958, p. 143 + 3 pages.

Strain-sensing element consists, of a cylindrical steel tube having wire strain gages bonded to its inner surface. When potted this tube is subjected to the internal forces in the casting.

6056 Bis(Aminophenyl)sulfones as Curing Agents for Epoxy Resins. Walter H. C. Rueggeberg, J. Edward Singley, Charles E. Feazel, and Edgar A. Verchot. *Modern Plastics*, v. 35, Feb. 1958, p. 154 + 2 pages.

6057* Plastic Foams. A New Textile Material. J. Edward Lynn. *Modern Textiles Magazine*, v. 39, Jan. 1958, p. 49-52.

Common methods of producing foams; comparison of properties of flexible foams offered for apparel use.

6058* (German.) Use of Dicyclopentadienyl-Iron in the Iron-Redox-Polymerization of Styrene. **Die Anwendung von Dicyclopentadienyl-Eisen bei der Eisen-Redox-Polymerisation von Styrol.** Werner Kern, Marco-Antonio Achon-Samblancat, and Rolf C. Schulz. *Monatshefte für Chemie*, v. 88, no. 5, Dec. 1957, p. 763-767.

Dicyclopentadienyl-iron catalyzes the redox reaction between benzoyl peroxide and benzoin and thus can be applied to the iron-redox-polymerization of styrene in a benzene solution.

6059* (German.) Study of the Polymerization of Styrene in Solution. **Zur Kenntnis der Polymerisation des Styrols in Lösung.** J. W. Breitenbach and A. Schindler. *Monatshefte für Chemie*, v. 88, no. 5, Dec. 1957, p. 810-821.

Mechanism of the polymerization in mixtures with aromatic and aliphatic chlorinated hydrocarbons when stimulated by azoisobutyrate nitrile and benzoyl peroxide at 70 C.

6060* (German.) Uronic Acid Polymers. **Über Uronsäurepolymere.** O. Schier and E. Waldmann. *Monatshefte für Chemie*, v. 88, no. 5, Dec. 1957, p. 847-856.

Study of different reactions of alginic acid and pectin. Simple method of producing uronic acids from these polymers. Synthetic polymers obtained by condensation of the lactones or esters of uronic acid with diamines.

6061* (German.) Triazinepoxy Resins. **Triazinepoxydharze.** A. Wende and H. Priebe. *Plaste und Kautschuk*, v. 4, no. 12, Dec. 1957, p. 451-457.

Production and properties of the resins and their mixtures with phenolepoxy resins are given, with methods of their treatment.

6062* (German.) Low Viscosity Casting Resins on the Basis of Epoxy Compounds. Production, Treatment, Properties, and Use. **Niedrigviskose Giessharze auf Basis von Epoxydverbindungen. Herstellung, Verarbeitung, Eigenschaften und Anwendung.** H. Jahn. *Plaste und Kautschuk*, v. 4, no. 12, Dec. 1957, p. 457-459.

By the systematic modification in arrangement and of the reaction conditions, production of low mol. wt. epoxy-based compounds was attempted.

6063 Screw Extrusion of Granular "Fluon" Polytetrafluoroethylene Powder. E. M. Elliott. *Plastics*, v. 23, Jan. 1958, p. 8-9.

6064 Graft Copolymers. III. S. H. Pinner and V. Wycherley. *Plastics*, v. 23, Jan. 1958, p. 27-30.

Comparison of synthetic methods of grafting polymers; properties and possible applications.

6065 Mold Design Technology for Polyethylene. R. W. VanSickle. *Plastics Technology*, v. 4, Jan. 1958, p. 35-40.

Part design and mold components, rigidity, and temperature control can be tailored to fit the special needs of polyethylene injection molding.

6066 Plastic Pipe in the Chemical Process Industry. R. B. Seymour. *Plastics Technology*, v. 4, Jan. 1958, p. 46 + 6 pages.

The present status of plastic pipe for combating corrosion in chemical processing.

6067 Significance of Second-Order Transitions of Polyester and Epoxy Resins in Glass Fiber-Reinforced Laminates. A. D. Coggeshall. *Plastics Technology*, v. 4, Jan. 1958, p. 51-59.

6068 Selection Guide for Sandwich-Panel Core Materials. R. K. Humke. *Product Engineering*, v. 29, Jan. 20, 1958, p. 70-75.

Guide to the wide choice in materials now available.

6069 Plastics at Work. I. Main Techniques for Processing. II. Engineering—Turning and Welding. David Alexander. *Rubber Journal*, v. 134, Jan. 11, 1958, p. 47-50; Jan. 18, 1958, p. 84 + 2 pages.

Plastics engineering. Machining, sawing, guillotining, and drilling. Resistance of polythene and PVC to numerous chemicals. Techniques involved in turning and welding PVC and polythene.

6070 Manufacture and Properties of Vinyl Polymers and Copolymers. M. S. Welling. *Rubber Journal*, v. 134, Jan. 18, 1958, p. 98 + 3 pages.

6071* (Russian.) Properties of Film-Forming Polymers and Their Application to the Inset Movable Electrode of a Capacitor Microphone. **Svoistva plenkoobrazuiushchikh polimerov i ikh primenenie dlia podvizhnogo elektroda kapsiulia kondensatornogo mikrofona.** B. N. Korostylev, G. V. Butakov, and A. A. Petrova. *Tekhnika Kino i Televideniia*, 1957, no. 12, Dec., p. 51-55.

Development of a material for a capacitor microphone membrane with specific properties meeting technological requirements. Investigation of various film-forming substances and testing methods.

6072* Vinyl Chloride Monomer and Its Polymerization. Abstracts and Bibliography. Not paged. Nov. 1957. Dow Chemical Co., Midland, Michigan. (ZTP156.P6 D76v Ref.)

Presents 1214 well-indexed references to the literature through 1955.

6073* (German.) Polyvinylpyrrolidone. **Polyvinylpyrrolidon.** Josef Schurz. *Wissenschaftliche Annalen*, v. 6, no. 11, Nov. 1957, p. 785-790.

Preparation and properties; use as a blood substitute.

6074* (German.) Investigation of High Polymer Acryl Derivatives. **Untersuchungen an hochpolymeren Acrylderivaten. IV.** UV and IR Spectrographic Investigation of Vinyon *N* and Its Saponification Products. **UV- and UR-spektrographische Untersuchungen an Vinyon *N* und seinen Verseifungsprodukten.** H. Bayzer and J. Schurz. *Zeitschrift für Physikalische Chemie (Frankfurt)*, v. 13, nos. 3-4, Nov. 1957, p. 223-233.

6075* (Russian.) The Effect of Hexamethylenetetramine on the Transformation of PVC Into a Three-Dimensional Polymer. **Vliianie geksametilentetramina na prevrashchenie polivinilkhlorida v trekhmernyi polimer.** G. S. Petrov and V. F. Prosvirkina. *Zhurnal Prikladnoi Khimii*, v. 30, no. 11, Nov. 1957, p. 1660-1668.

The effect of temperature on the formation in PVC in the presence of hexamethylenetetramine, diphenyl amine, and diphenyl urea.

See also: **4975** (peroxycarbamates as vinyl polymerization initiators); **4978** (free radical reactions on vinylsilanes); **5170** (polysulfone formation); **5214** (polyethylene-wax coatings); **5304** (casting resins in high voltages); **5785** (reinforced epoxy dies); **5867** (radioisotopes in polymer chemistry); **6145** (aminoplast glues).

POLLUTION AND WASTES

6076* (Spanish.) Aerodynamic Dust Collectors. **Captadores aerodinámicos de polvos.** Rafael Morilla Soler. *Acero y Energía*, v. 14, no. 83, Sept.-Oct. 1957, p. 46 + 6 pages.

A study of the application of dust collection from air and smokes to separation chambers, impact and cyclonic separators. Movement of the particles; resistance of the medium. Industrial applications.

6077* Annular Kinetic Impactor. J. E. Hoy and J. J. Croley, Jr. *American Industrial Hygiene Association Quarterly*, v. 18, Dec. 1957, p. 312-314.

A preliminary report of one aspect of an over-all study designed to test the applicability of an annular impactor. Such an instrument is of interest in connection with the possibility of establishing working requirements in radioactively contaminated areas.

6078* Diffusion and Deposition in Relation to Reactor Safety Problems. Maynard E. Smith and Irving A. Singer. *American Industrial Hygiene Association Quarterly*, v. 18, Dec. 1957, p. 319-330.

Attention is centered on the distribution of fission products that might accompany a major reactor failure, and therefore is largely concerned with meteorological processes.

6079* Air Pollution Control at a Nylon Intermediates Plant. H. R. L. Streight. *Engineering Journal*, v. 41, Jan. 1958, p. 69-78.

Air pollution was reduced by designing the boiler house stacks for adequate dispersion of flue gases and by developing and installing an absorption system for almost complete removal of nitrogen oxides in effluent gases. Atmospheric surveys, made before and after operation began, showed the safe concentrations of potential contaminants.

6080* (German.) The Problem of Waste Water at the Research Reactor Munich. **Die Abwasserfrage beim Forschungsreaktor München.** Friedrich Wieselsberger. *Gas- und Wasserfach*, v. 98, Ausgabe Wasser, no. 50, Dec. 13, 1957, p. 1245-1248.

The disposal of solid and liquid waste products in the operation of the Munich atomic reactor is described.

6081* (German.) Aeration Experiments at the Biological Sewage Treatment Plant at Gevelsberg in the Ruhr Region. **Belüftungsversuche auf der biologischen Kläranlage Gevelsberg des Ruhrverbandes.** Herbert Rohde. *Gas- und Wasserfach*, v. 98, Ausgabe Wasser, no. 52, Dec. 27, 1957, p. 1289-1298.

Technical experimental investigations on the introduction of O in a spiral-shaped flow through an aeration tank.

6082 The Meaning, Significance, and Expression of Commonly Measured Water Quality Criteria and Potential Pollutants. Howard B. Brown. *Louisiana State University, Engineering Experiment Station Bulletin No.* 58, 1957, 46 p. (TA21 L93.72b Vis.)

6083 Proceedings of the Sixth Annual Water Symposium, Feb. 1957. *Louisiana State University, Engineering Experiment Station Bulletin No.* 59, 1957, 76 p. (TA21 L93.72b Vis.)

6084* Radio-Active Effluent Disposal. Leo Walter. *Mechanical World and Engineering Record*, v. 138, Jan. 1958, p. 34-37.

Measures taken to keep radioactivity of effluents from a nuclear plant below a maximum level.

6085 Science for Electroplaters. XXXII. Cyanide Waste Treatment—Hypochlorites. L. Serota. *Metal Finishing*, v. 56, Jan. 1958, p. 61 + 4 pages.

Oxidation of cyanides by hypochlorites proceeds in two stages; with conversion of cyanide to cyanate, followed by complete decomposition yielding CO_2 and N as the end products.

6086* Preventing Stream Pollution. Larry Cook. *Mining Congress Journal*, v. 44, Jan. 1958, p. 62-64.

What the surface mining industry in the state of Ohio is doing to prevent or reduce stream pollution.

6087 The Acid Mine-Drainage Problem in Ohio. E. Q. Moulton. *Ohio State University, Engineering Experiment Station, Bulletin No.* 166, v. 26, no. 5, Nov. 1957, 158 p. (TA21 O3b Vis.)

The results of a nine month research program to survey the pollution problem and develop sufficient data on which a sound future research program can be based. Bibliography of 538 annotated references.

6088* (German.) Some Concepts of Dust Technology. **Begriffe der Staubtechnik. IV.** Dust as a Charge Carrier. **Staub als Ladungsträger.** E. Feifel. *Radex Rundschau*, no. 7, Dec. 1957, p. 904-917.

Effect of grain size of dust on intensity of electrostatic charge in a gas flow. Electrostatic measurement of dust contents.

6089* Movement of Coliform Bacteria Through Porous Media. R. B. Krone, G. T. Orlob, and Carl Hodgkinson. *Sewage and Industrial Wastes*, v. 30, Jan. 1958, p. 1-13.

Discusses experimental results which show the interrelation of bacterial accumulation on the straining sites and sedimentation, as well as the relative capacities of the removal mechanisms.

6090* Studies on Sludge Digestion and Methane Fermentation. I. Sludge Digestion at Increased Solids Concentrations. K. L. Schulze. *Sewage and Industrial Wastes*, v. 30, Jan. 1958, p. 28-45.

Increasing the solids concentrations in sludge digesters appears to be impractical as a result of this study. Further studies should be made on waste and garbage burial methods.

6091 Symposium on Industrial Water and Industrial Waste Water. 52 p. 1957. American Society for Testing Materials, Philadelphia. (TD201 Am35s)

Industrial waste problems in Southern California; water pollution control in the Los Angeles area; sea water purification; use of organic flocculants and flocculating aids.

6092* Biochemical Degradation By-Products. A New Form of Water Pollution? R. H. Bogan. *Trend in Engineering (University of Washington)*, v. 10, Jan. 1958, p. 11-17.

Organic stream pollutants may not be adequately evaluated in terms of B.O.D. or C.O.D. values alone. Biochemical degradation intermediates or by-products have been demonstrated during the breakdown of oils and alkyl benzene sulfonates.

6093* Redox Potentials in Sludge Digestion. W. N. Grune and T. H. Lotze. *Water & Sewage Works*, v. 105, Jan. 1958, p. 37-41.

Research results on two laboratory sludge digesters equipped with redox potential cells are presented. An excellent correlation between oxidation - reduction potentials and digestion progress can be obtained.

See also: **4862** (determination of organic acids in water); **5273** (electrodialytic desalted water); **5523** (refractive index of smokes and aerosols); **6113** (lignin utilization).

RUBBER AND ELASTOMERS

6094 Determination of Polyisobutylene in Rubber Products. K. E. Kress. *Analytical Chemistry*, v. 30, Feb. 1958, p. 287-290.

The material is extracted with acetone, then digested in concd. HNO_3 to destroy natural and styrene-butadiene polymers.

6095* A Review of the Comparative Bacteriology of *Hevea* Latex and Its Commercial Derivatives. D. H. Taysum. *Applied Microbiology*, v. 5, Nov. 1957, p. 349-355.

6096* (Russian.) Influence of Degree of Deformation on Formation of Cracks in Rubber Caused by Ozone. **Vliianie stepeni deformatsii na ozonnoe rastreskivanie rezin.** Iu. S. Zuev and S. I. Pravednikova. *Doklady Akademii Nauk SSSR*, v. 116, no. 5, Oct. 11, 1957, p. 813-816.

A study of critical deformation in vulcanized rubber. Effect of size of deformation on time of crack appearance, rate of crack growth, time before rupture, and dynamic resistance of various rubbers.

6097* (German.) Surface-Heating Due to Friction and Wear Through Thermal Decomposition. **Oberflächen-Erwärmung durch Reibung und Verschleiss durch thermische Zersetzung.** W. Viehmann. *Kautschuk und Gummi*, v. 10, no. 12, Dec. 1957, p. WT302-WT307.

Attempts to determine the friction temperature of tires based on the phenomenologic theory of heat conductivity.

6098* (Russian.) The Coagulation Mechanism of Butadiene-Styrene Latices. **O mekhanizme koaguliatsii butadienstirol' nogo lateksa.** S. A. Glikman and E. P. Korchagina. *Kolloidnyi Zhurnal*, v. 19, no. 6, Nov.-Dec. 1957, p. 657-661.

The process takes place in two stages. The first stage is the result of a drop in the ζ-potential and leads to the formation of primary particles of a volume tenfold that of the latex globules. The course of the secondary processes is coalescence.

6099 Rubber-Marlex 50 Polyethylene Blends. H. E. Railsback and R. C. Wheat. *Rubber Age*, v. 82, Jan. 1958, p. 664-671.

A new linear polyolefin offers significant advantages in compounding rubber stocks for numerous applications.

6100 Rubber Compounding Information. Kathleen S. Rostler. *Rubber Age*, v. 82, Jan. 1958, p. 678 + 11 pages.

Basic sources of information on rubber compounds and methods of indexing and locating specific compounds. A file of marginally punched cards for rubber compounds is described.

6101* Polyurethane VC, a Virtually Cross-Linked Elastomer. C. S. Schollenberger, H. Scott, and G. R. Moore. *Rubber World*, v. 137, Jan. 1958, p. 549-555.

This linear poly(ester-urethane) displays the properties of a rubber vulcanizate and has a practical degree of solvent resistance without vulcanization.

6102* Light-Colored, Non-Blooming Butyl Rubber Compounds. R. O. Treat and J. E. Aller. *Rubber World*, v. 137, Jan. 1958, p. 557 + 11 pages.

Data on the proper types and amounts of accelerators, processing aids, mineral fillers, and proper mixing conditions.

SPACE HEATING AND CONDITIONING

6103* (German.) The Effect of Contamination on Heat Transfer in Apparatus Used in Refrigeration and Experimental Techniques. **Der Einfluss der Verschmutzung auf die Wärmeübertragung bei Apparaten der Kältetechnik und Verfahrenstechnik.** W. Niebergall. *Allgemeine Wärmetechnik; Zeitschrift für Wärme-, Kälte- und Verfahrenstechnik*, v. 8, no. 4, 1957, p. 73-86.

Calculation of heat transmission by clean and soiled surfaces. Incrustation and corrosion. Development and nature of the dirt layers. Examples.

6104 American Society of Heating and Air-Conditioning Engineers, Transactions (Annual Volume), v. 63, 1957, 552 p. American Society of Heating and Air-Conditioning Engineers, New York. (TH7201 Am35t Vis.)

Contains 28 papers reporting recent research on various heating and air-conditioning problems.

6105 Pulsations in Residential Heating Equipment. Preliminary Results. A. A. Putnam and W. R. Dennis. *American Society of Heating and Air-Conditioning Engineers, Transactions*, v. 63, 1957, p. 153-170. (TH7201 Am35t Vis.)

Theoretical and experimental methods used to investigate the fundamental nature of pulsations in oil- and gas-fired residential furnaces and boilers. The oscillations thus far encountered are of the standing-wave type. The design of two experimental furnaces and test results are reported.

6106 Acoustic Coupling of Residential Furnaces With Their Surroundings. C. F. Speich, W. R. Dennis, and A. A. Putnam. *American Society of Heating and Air-Conditioning Engineers, Transactions*, v. 63, 1957, p. 413-426. (TH7201 Am35t Vis.)

Studies with residential gas- and oil-fired furnace-burner units indicate that coupling can occur between the unit and the room in which it is placed. Factors to be considered in determining the proper furnace location for low noise level are discussed.

6107* Thermal Conductivity of Liquid Refrigerants. B. R. Malhotra. *Modern Refrigeration*, v. 60, Dec. 1957, p. 497-502.

The objective was to develop an apparatus for measuring the thermal conductivity of refrigerants in the liquid state at temperatures below 50 F.

6108 Refrigeration, Air Conditioning, and Cold Storage Principles and Applications. Raymond C. Gunther. 1232 p. 1957. Chilton Co., Philadelphia. (TP492 G95r)

The processes essential to the operation and maintenance of the refrigeration system proper. The refrigeration cycle including physical, chemical, and thermodynamic properties of refrigerants. Principles of application in all processes requiring the extraction of heat by mechanical means.

6109 (Dutch.) Heat Transfer and Condensation Phenomena in Structures. **Warmtetransport en condensatieverschijnselen in bouweonstructies.** B. H. Vos. *T. N. O.-Nieuws*, v. 12, no. 141, Dec. 1957, p. 623-631.

Theoretical basis of insulation in walls. Measuring coefficient of heat conductivity by the steady method of Hamaker and the non-steady method of Van der Held. Effects of the humidity content on measurements.

See also: **6007** (cryogenic process).

TEXTILES, FIBERS, LEATHER, AND PAPER

6110* Spraying Jack Pine Pulp Logs. R. D. Shenefelt, M. J. Stelzer, T. A. Pascoe, and F. G. Kilp. *Agricultural Chemicals*, v. 13, Jan. 1958, p. 38-40.

Twelve per cent γ BHC controls insects in jack pine pulp wood—yield of peeled wood shows increase—economics shows 95% saving in treated woods.

6111* The Effect of Silicone Softeners on Resin-Treated Cottons. B. G. Simpson. *American Dyestuff Reporter*, v. 46, Dec. 30, 1957, p. P991-P998.

Tensile strength, tear strength; flex abrasion; wrinkle recovery.

6112* Ratio of Lignosulfonate to Vegetable Tannin Take-Up From Blends in Sole Leather Tanning. John Davis, Richard Benning, and Martin Baum. *American Leather Chemists Association, Journal*, v. 53, Jan. 1958, p. 24-38.

Fractionated sodium lignosulfonate was mixed with vegetable tans—wattle and/or quebracho—to give blends of approximately 10.75% total tannin, of which 35% was lignosulfonate. Analysis of new and refortified liquors showed that ratio of tannin methoxyl to tannin content and ratio of lignosulfonate to vegetable tannin as determined by paper chromatography remained constant throughout the six cycles.

6113* Present Status of Chemical Utilization of Lignin. Irwin A. Pearl. *Forest Products Journal*, v. 7, Dec. 1957, p. 427-432.

Reports modifications of old and new commercial processes for by-product lignin utilization that have been initiated in both the sulfite and kraft pulping industries.

6114* The Lignin Dimethyl Sulfide Process. W. M. Hearon. *Forest Products Journal*, v. 7, Dec. 1957, p. 432-434.

A new process based on reacting lignin with inorganic sulfur compounds at elevated temperatures and pressures, will make large quantities of the dimethyl sulfide available at reasonable price.

6115* Chemical Properties, Derivatives, and Uses of Levulinic Acid. Carl Bordenca. *Forest Products Journal*, v. 7, Dec. 1957, p. 435-436.

Alpha-angelica lactone, vinyl levulinate, celluloses, levulinate acetate, dimethyl-pyrrolidone, and basic aluminum levulinate are described.

6116* (English.) **A Pulp Washer for Laboratory Use.** Henrik H. Bruun and Bo Ahlskog. *Paperi ja Puu*, v. 39, no. 12, Dec. 1957, p. 577-579.

A laboratory apparatus for pulp washing and liquor removal based on the compression principle has been developed. The apparatus and the results obtained with it are described.

6117* Studies in Hydrogen-Bond Formation. VI. The Role of Hydrogen Bonds in Dyeing Processes. D. S. E. Campbell, D. Cathcart, and C. H. Giles. *Society of Dyers and Colourists, Journal*, v. 73, Dec. 1957, p. 546-553.

Non-ionic polar groups in dyes and other aromatic compounds can form intermolecular H-bond complexes in water with a variety of organic compounds. Hydrogen-bond formation between dyes and fibers in presence of water appears to be possible with protein fibers, nylon, cellulose acetates, Terylene, and acrylonitrile fibers, but is less likely to occur with cellulosic fibers.

6118* Changes in the Mechanical Properties of Collagen Fibres During Vegetable Tannage. R. G. Mitton and F. R. Morgan. *Society of Leather Trades' Chemists, Journal*, v. 41, Nov. 1957, p. 383-387.

6119* The Effect of Freeze-Drying on the Soluble Proteins of Bovine Hide. D. R. Cooper. *Society of Leather Trades' Chemists, Journal*, v. 41, Nov. 1957, p. 387-394.

Shows that the method which should cause least denaturation of the soluble proteins (i.e. freeze-drying) does, in fact, affect the solubility of some components present in the ground substance of hide.

6120* (English.) **On the Influence of Pre-Steaming on the Effect of Crease-Resisting Treatments of Viscose Rayon Fabrics.** Nils Landqvist. *Svensk Kemisk Tidskrift*, v. 69, no. 11, 1957, p. 524-532.

Steaming increases the presumptive wear properties of the fabric, as determined by the "duty factor", at the same crease recovery level, and also improves the crease recovery. Effect of steam or resin treatments on mechanical, water retention, and dye absorption properties was studied.

6121* (English.) **A Proposed Method for Determining the Permanganate Number of Pulps.** Christian Valeur and Ivan Törngren. *Svensk Papperstidning*, v. 60, no. 22, Nov. 30, 1957, p. 829-835.

Addition of chemicals and total volume are kept constant, but pulp addition is varied continuously. Adjusting the amount of pulp so that 50% of the added permanganate remains after reaction allows definition of the permanganate number. Correction for 30-70% excess.

6122* (English.) **Molecular Weight of Native Celluloses.** T. E. Timell. *Svensk Papperstidning*, v. 60, no. 22, Nov. 30, 1957, p. 836-842.

Isolating the cellulose component in a maximum yield and with a minimum of depolymerization from 22 cellulosic materials. Intrinsic viscosity in *m*-butyl acetate. Viscosity adjustment for a trisubstituted nitrate. Tests on seven cellulose nitrates.

6123* The Distribution of Substituents in Partially Methylated Celluloses. I. Homogeneous and Heterogeneous Reaction With Methyl Sulphate. Ingemar Croon and Bengt Lindberg. *Svensk Papperstidning*, v. 60, no. 22, Nov. 30, 1957, p. 843-849.

Hydrolysis to glucose and glucose methyl ethers. Quantitative chromatographic separation on a carbon column. Further fractionation for some components. All products of hydrolysis, glucose, three monomethyl ethers, three dimethyl ethers, and a trimethyl ether were isolated in a state of purity and characterized.

6124* (English.) **Degradation of Cellulose by Alkali Cooking.** Olle Franzon and Olof Samuelson. *Svensk Papperstidning*, v. 60, no. 23, Dec. 15, 1957, p. 872-877.

Degradation of native and mercerized cotton cellulose by alkali cooking at 170 C. Correlation between carboxyl content and the osmotically determined degree of polymerization of the degraded cotton.

6125* (Swedish.) Pitch Troubles in Sulphite Plants and Remedies. **Hartssvårigheter i sulfitfabriker och deras bemästring.** Ernst Back. *Svensk Papperstidning*, v. 60, no. 24, Dec. 31, 1957, p. 905-910.

Troubles due to reactions involving resin components in bleaching steps following an alkaline treatment of the pulp. Preliminary stabilization of the resin by uncharged hydrophilic groups and by anionic and non-ionic surfactants.

6126* The Coupling and Design of Cyclone Installations. G. H. Nuttall and I. F. Hendry. *Tappi*, v. 40, Dec. 1957, p. 951-965.

Theoretical principles of design for a battery of high-efficiency cyclones which achieves a maximum efficiency of dirt separation for a minimum fiber loss compatible with economic capital and pumping costs.

6127 (English.) **Pitch Troubles Caused by Sulphite Pulp. III. The Influence of the Storage of Wood on the Amounts of Pitch Deposited on a Copper Surface.** C. G. Taxell, Ch. Gustafsson, S. Kahila, T. Lindh, and V. Tammela. **IV. The Influence of Different Manners of Barking of Spruce Wood and of Storage Successively on Land and in Water on the Amounts of Pitch From Sulphite Pulp Deposited on a Metal Surface.** Ch. Gustafsson, S. Kahila, and T. Lindh. *Teollisuuden Keskuslaboratorion Tiedonantoja* 178 and 182, 1957, 6 and 6 p. (Reprinted from *Paper and Timber*, 1957, no. 38, p. 179-183; no. 39, p. 277-282.) (TS1080 C33m Contin.)

6128 The Application of Fluid Beds to Textile Processing. F. G. Audas, C. G. Badcock, W. McNabb, and J. A. Wilson. *Textile Institute, Journal (Proceedings)*, v. 48, Dec. 1957, p. 767-776.

Discusses potential value in drying fabrics, resin baking, printing, and certain methods of dying.

6129 Improvements in Integrators for Electronic Regularity Testers. J. L. Spencer-Smith. *Textile Institute, Journal (Transactions)*, v. 48, Dec. 1957, p. T474-T483.

A comparison of electronic yarn regularity testers shows that although autographic records agree, the integrator readings of the coefficient of variation may vary considerably. Variations in integrator performance occur because the conventional integrator measures a biased average of deviations from the mean and the bias may vary from one instrument to another. This irregularity is discussed and patented circuits are presented to correct it.

6130* Mechanics of Elastic Performance of Textile Materials. XIII. Torque Development in Yarn Systems: Singles Yarn. Milton M. Platt, William G. Klein, and Walter J. Hamburger. *Textile Research Journal*, v. 28, Jan. 1958, p. 1-14.

Analyzes the torque developed in twisted singles yarns as created by fiber bending, fiber torsion, and bending and torsion in combination. Equations are developed, using elastic theory, relating singles yarn torque to fiber elastic properties, fiber geometry, and singles yarn structure.

6131* (German.) Disintegration of Alkalized Cellulose With Molecular Oxygen. **Über den Abbau von alkalisierter Cellulose mit molekularem Sauerstoff. IV.** Hermann G. Müller. *Textil-Rundschau*, v. 12, no. 12, Dec. 1957, p. 671-684.

Methods for dehydrating alkalized cellulose. Water vapor absorption from the dehydrated cellulose. Effects of sorption time, concentration of the immersion lye solution, and of alkali content. Effect of dehydration on the cellulose properties after regeneration.

See also: **4854** (hydroxyproline analysis); **4870** (acetylation of cotton); **4960** (azo dyes containing P); **5014** (unstabilized cellulose nitrates); **5393** (European textile statistics); **5488** (tree height measurement); **6057** (plastic foam as textile material).

WELDING AND JOINING

6132 (English.) **Manual Arc-Welding of Stainless and Heat-Resisting Steels and Alloys With Fusible Electrodes.** *Aciers Fins & Spéciaux Français*, 1957, no. 27, Dec., p. 106-110.

Metallurgical considerations controlling the choice of electrodes. Making special electrodes. Welding procedures for various alloys.

6133* (German.) Welding and Cutting of Aluminum With Gas Shielded Arc. **Die Schweiss- und Schneidverarbeitung von Aluminium mit edelgasabgeschirmten Lichtbögen.** W. Mantel and L. Wolff. *Aluminium*, v. 34, no. 1, Jan. 1958, p. 36-40.

Various causes of porosity and possibilities for its prevention.

6134 Soldering Aluminium. *Aluminum Development Association, Information Bulletin No.* 23, Nov. 1957, 35 p. (TS550 AL82i Vis.)

Information is prepared for product designers, production engineers, and executives.

6135* (Russian.) The Interaction Kinetics of Metal and Slag in Flux Welding. **O kinetike vzaimodeistviia metalla i shlaka pri svarke pod fliusom.** I. I. Frumin. *Avtomaticheskaia Svarka*, v. 10, no. 6, Nov.-Dec. 1957, p. 3-18.

The chemical composition of the deposited metal is determined by welding conditions. The rate of interaction is determined by the size of the interphase surface and the conditions of mass transfer in slag.

6136* (Russian.) Peculiarities of Hydrogen Behavior During the Electroslag Process. **Osobennosti povedeniia vodoroda pri elektroshlakovom protsesse.** D. A. Dudko, I. N. Rublevskii, and D. F. Chernega. *Avtomaticheskaia Svarka*, v. 10, no. 6, Nov.-Dec. 1957, p. 28-34.

Effect of the type of current and polarity on the amount of H in molten metal and in crystallized deposited metal.

6137* (Russian.) Alloying of Deposited Metal Through Flux as a Means of Eliminating Pores. **Legirovanie naplavlennogo metalla cherez flius dlia bor'by s porami.** A. E. Asnis and L. M. Gutman. *Avtomaticheskaia Svarka*, v. 10, no. 6, Nov.-Dec. 1957, p. 62-70.

Causes of pore formation were studied. Mechanical admixture of the Al-Fe alloy with the flux eliminates pores.

6138 (German.) Development of Cold-Pressure-Welding and Cold-Pressure-Soldering. **Versuche zur Weiterentwicklung der Kalt-Presschweissung und Kalt-Presslötung.** Fritz Burat and Wilhelm Hofmann. *Braunschweigischen Wissenschaftlichen Gesellschaft, Abhandlungen*, v. 8, 1956, p. 85-98. (Q3 B73a Vis.)

Cold-welding of steel can be achieved by putting sheets of softer metals between the two steel pieces so that the sheet material and the steel as well will be deformed. Experiments showed that the deformation of the steel was promoted by the interposed softer metal. Thin particles were torn off with growing deformation and growing thickness of the sheet material.

6139* Science and Technique of Welding in the Soviet Union. N. N. Rykalin. *British Welding Journal*, v. 4, Dec. 1957, p. 541-547.

Deals particularly with automatic welding and describes the electro-slag welding process for the single-pass welding of thick plates or slabs.

6140* Projection Welding of 24 s.w.g. Mild Steel. J. E. Roberts and G. A. Phipps. *British Welding Journal*, v. 4, Dec. 1957, p. 557-563.

Technique to determine optimum welding conditions for single, double, and triple projection welds in mild steel is described.

6141* Bonding Ceramics to Metals. A. E. Williams. *Industrial Finishing*, v. 10, Jan. 1958, p. 22-26.

Agents in use today and how they are applied.

6142 Tips on Welding Stainless. H. F. Reid, Jr. *Iron Age*, v. 180, Dec. 26, 1957, p. 58-60.

Today's choice of processes, electrodes, and techniques for the variety of stainless materials now available.

6143* "Squirt Gun" Welds Dissimilar Metals. A. R. Kemeter. *Metalworking Production*, v. 101, Dec. 13, 1957, p. 2220-2221.

Heavy sections of steel and 3/16-in. stainless sections are joined securely by semi-automatic, submerged-arc technique employing 18-8 stainless wire and a special chrome-enriched flux.

6144* Dip Brazing Magnesium. William J. Graves. *Modern Metals*, v. 13, Jan. 1958, p. 40 + 1 page.

A six-step process is used to make extremely precise Mg waveguide systems.

6145* (German.) Determining the Adhesion of Aminoplast Glues in Practice. **Über die Bestimmung des Festgehaltes von Aminoplast-Leimen in der Praxis.** W. Reiszmann. *Plaste und Kautschuk*, v. 4, no. 11, Nov. 1957, p. 418-421.

New method using a refractometer decreases the testing time to 30 min.

6146* (German.) The Revolutionary Effect of Welding on Engineering. **Der umwälzende einfluss des schweissens auf die technik.** K. Klöppel. *Schweissen und Schneiden*, v. 9, no. 12, Dec. 1957, p. 503-512.

A historical survey.

6147* (German.) Influence of Gases in Arc Welding of Steel. **Einfluss der Gase beim Lichtbogenschweissen von Stahl.** J. D. Fast. *Schweissen und Schneiden*, v. 9, no. 12, Dec. 1957, p. 512-517.

Interaction between gas and liquid weld metal. Formation of blowholes. Detrimental influence of gases in the weld metal. Aging phenomena and brittleness caused by gases.

6148* (German.) Influence of Hydrogen on the Properties of Welds. **Einfluss von Wasserstoff auf die Eigenschaften der Schweisse.** P. C. van der Willigen. *Schweissen und Schneiden*, v. 9, no. 12, Dec. 1957, p. 517-521.

Super-saturation with H; micro-cracks and macro-cracks; fish eyes.

6149* (German.) The Metallurgical Reactions Between Brazing Alloys and Base Materials and Resulting Conclusions Appertaining to Structures Designed for Brazing. **Die metallurgischen Vorgänge zwischen Hartlot und Grundwerkstoffen und Folgerungen für die lötgerechte Konstruktion.** Johannes Schatz. *Schweissen und Schneiden*, v. 9, no. 12, Dec. 1957, p. 522-530.

Wetting and its dependence on the free energy ΔG. Connection between energy ΔG and formation enthalpy ΔH. Measuring method for interfacial tension.

6150* (Dutch.) Fatigue and Welding Technique. **Vermoeiing en lastechniek.** H. Thomas. *Smit Mededelingen*, v. 12, no. 3, July-Sept. 1957, p. 97-107.

A survey of fatigue tests covering simple weld connections as well as rather complete structures. Welding faults, irregularities at the plate surface, and faulty construction influence fatigue life.

6151* (Dutch.) Hard Surfacing. **Het oplassen van slijtvaste lagen. II.** P. G. Weeber. *Smit Mededelingen*, v. 12, no. 3, July-Sept. 1957, p. 116-124.

Vertical upward welding and bead welding over the full breadth in order to avoid cracks, only two layers are necessary. Surfacing workpiece with electrodes to a thickness sufficient to weld two layers with the desired wear resisting electrodes. Unionmelt-welding.

6152* (French.) A Few Examples of the Application of Electric Resistance Welding in the Field of Metal Frame Structure. **Quelques exemples d'application du soudage électrique par résistance dans le domaine de la charpente métallique.** J. M. Labessoulhe. *Soudage et Techniques Connexes*, v. 11, nos. 11-12, Nov.-Dec. 1957, p. 357-367.

Progress in the construction of machines for welding metal frame structures, capable of assembling two thicknesses of 25 mm. or three thicknesses of 20 mm. on an industrial basis, by the principle of resistance spot welding.

6153* (French.) Welding Cracks in the Heat-Affected Zone of Air-Hardening Alloy Steels. **Fissuration due au soudage dans la zone de transformation des aciers alliés trempant à l'air.** H. Sekiguchi and T. Kobayashi. *Soudage et Techniques Connexes*, v. 11, nos. 11-12, Nov.-Dec. 1957, p. 397-403.

Results from depositing arc welded or inert gas shielded arc beads on an alloy steel specimen, by the arc process using various types of electrodes. Underbead, longitudinal, transverse, and bond types of cracks can be seen. Austenitic electrodes give the best results; preheating and postheating reduce the risks of cracking.

6154 How to Weld Copper and Its Alloys. I. Lester F. Spencer. *Steel*, v. 142, Jan. 27, 1958, p. 86-89.

Rules for the inert gas, metal arc method.

6155* (Czech.) Arcless Submerged Welding With Magnetically Advancing Heads. **Svařování pod tavidlem bez oblouku magneticky kráčejícími hlavami.** M. M. Fiškis. *Strojírenská Výroba*, v. 5, no. 11, Nov. 1957, p. 511-514.

New welding method for heavy sheets (10 to 330 mm). Design of the welding head of arcless welders. Welding conditions. Parts of presses used for welding.

6156* (Czech.) Resistance Welders. **Odporové svařovací stroje.** M. Veselý. *Strojírenská Výroba*, v. 5, no. 11, Nov. 1957, p. 528-533.

Technical characteristics of some new welding machines and their suitability for certain types of work.

6157* (Czech.) Novelties in Flame Welding and Oxygen Cutting Equipment. **Novinky v zařízení pro svařování plamenem a řezání kyslíkem.** P. Šubrt and V. Slanař. *Strojírenská Výroba*, v. 5, no. 12, Dec. 1957, p. 573-574.

New types of welding torches with an output of 4.5 to 8.250 l. per hr. New torches and machines for O cutting. New design of regulating valves.

6158* CO_2 Welding of Steel. R. W. Tuthill. *Tool Engineer*, v. 40, Jan. 1958, p. 82-86.

A blanket of CO_2 to shield the weld provides economical joints and makes the process visible to the operator.

6159* (German.) Behavior of Metal Glued With Adhesive. **Verhalten von Metallklebverbindungen.** Karl Wellinger and Ulrich Rembold. *VDI Zeitschrift*, v. 100, no. 2, Jan. 11, 1958, p. 41-46.

The strength of the joints of Al alloys with ethoxyline core depends on the preliminary treatment of the surfaces, hardening, and the grain fineness of the binding substance. Humidity lowers the stability of an adhesive compound. The tensile strength at low temperatures is higher.

6160 Fusion Welding in Pipe Fabrication. W. S. Schaefer. *Welding Engineer*, v. 43, Feb. 1958, p. 34-36.

Covers skelp and edge preparation; back-up bar; tab welding; pipe conditioning; hydraulic expansion; girth welding.

6161 New Techniques in Precision-Welding Control. J. L. Solomon and M. Balikov. *Welding Journal*, v. 37, Jan. 1958, p. 16-21.

Electronic control uses only one counting unit for all sequential functions; is insensitive to strong magnetic fields, line transients, or line voltage changes; and is free from all timing calibration adjustments.

6162 Equipment for Welding Reactive Metals. A. Mombrun and W. G. Hull. *Welding and Metal Fabrication*, v. 26, Jan. 1958, p. 9-11.

Equipment was designed for welding under contamination-free conditions to evaluate the weldability and properties of existing and newly developed alloys. It gives precise control over welding variables.

6163 Inert-Gas Tungsten-Arc Welding SAE 4130 Steel Sheet. III. The Effects of Welding Speed on Cracking. C. A. Terry and W. T. Tyler. *Welding and Metal Fabrication*, v. 26, Jan. 1958, p. 24-31.

Hot cracking occurs only within a limited range of welding speeds. Ferrite/pearlite banding exerts a marked influence on the severity of cracking.

6164* (German.) Iron-Nickel-Cobalt Alloys for Glass-Metal Joining Materials. **Über Eisen-Nickel-Kobalt-Legierungen für Glas-Metall-Verbindungen.** Horst Herrmann and Hans Thomas. *Zeitschrift für Metallkunde*, v. 48, no. 11, Nov. 1957, p. 582-587.

The α-γ phase transformation was traced by polarized light and by measuring the electrical resistance as a function of cold forming and heat treatment in five irreversible Fe-Ni-Co alloys.

See also: **4912** (analysis of Ag solder alloys); **5588** (mechanical testing of welded structural steels); **5789** (brazing of honey-comb sandwich structures).

MISCELLANEOUS

6165 All Union Conference on the Application of Radioactive and Stable Isotopes and Radiation in the National Economy and Science. Sections individually paged. 1957. Consultants Bureau, Inc., New York. (QC798 A51a Over.)

A compilation of abstracts of Russian papers concerning methods and apparatus for the radiometry and dosimetry of nuclear radiations, isotope production, high-intensity γ-systems, and use of isotopes in chemistry, study of friction and wear, corrosion technology, metallurgy, machine construction, control of technological processes, non-destructive testing, prospecting and development of useful minerals, petroleum recovery, heat technology, biology, medicine, agriculture, and other fields.

6166* Divided Differences in Complex Function Theory. Erben Cook, Jr. *American Mathematical Monthly*, v. 65, Jan. 1958, p. 17-24.

Shows advantageous application of the above.

6167 Ship Design Trend Survey for the Atomic Energy Commission Maritime Reactors Branch. David L. Conklin, Jack J. Gordon, and S. Reed Nixon. *American Radiator and Standard Sanitary Corp. (U. S. Atomic Energy Commission)*, ASAE-18, June 1957, 22 p. (UF767 Un3.1as Contin.)

6168* Pneumatic Handling Systems Solve Problems of Moving Bulk Material. L. G. Weller. *Automation*, v. 5, Jan. 1958, p. 69-74.

Three basic types of pneumatic handling systems and how they provide automated solutions to these problems.

6169 Career Opportunities in the Chemical and Chemical Process Industries. *Chemical and Engineering News*, v. 36, Jan. 27, 1958, pt. 2, p. 12-65.

Contains employment information from 42 companies in the chemical industry.

6170 Education for Planning: City, State, & Regional. Harvey S. Perloff. 189 p. 1957. Johns Hopkins Press, Baltimore. (NA9012 P42e)

Considers the question of what is an appropriate intellectual, practical, and philosophical basis for the education of city and regional planners.

6171 A Method for Computing Certain Inverse Functions. D. R. Morrison. *Mathematical Tables and Other Aids to Computation*, v. 10, no. 56, Oct. 1956, p. 202-208.

Applicable to the computation of logarithms and inverse trigonometric functions and is particularly suitable for use in automatic digital computing machines.

6172* (English.) **On the Expansion of Functions Satisfying Four Boundary Conditions.** S. Chandrasekhar. *Mathematika*, v. 4, no. 8, Dec. 1957, p. 140-145.

Fourier- and Fourier-Bessel-type functions are considered.

6173* Addition Theorems for Solutions of the Wave Equation in Parabolic Coordinates. Harry Hochstadt. *Pacific Journal of Mathematics*, v. 7, Fall 1957, p. 1365-1380.

6174 Guard Against Detonation Hazards. E. L. Ghormley. *Petroleum Refiner*, v. 37, Jan. 1958, p. 185-190.

When detonation can occur and steps to prevent its violent effects.

6175 Probability and Scientific Inference. G. Spencer Brown. 154 p. 1957. Longmans, Green and Co., New York. (QA273 B81p)

A theoretical analysis of the problem of scientific statistical calculations, including chapters on the workings of chance machines and the mathematical consequences of rejecting unrandom series.

6176 Road and Paving Materials. 76 p. American Society for Testing Materials, Philadelphia. (TE205 Am35r)

Testing techniques and correlation and reproducibility of laboratory tests involving the evaluation of properties and characteristics of paving asphalts.

6177 Spheroidal Wave Functions. Carson Flammer. 220 p. 1957. Stanford University Press, Stanford, Calif. (QA405 F61s)

Analytical properties of the functions. Tables of the various quantities entering into calculation of the functions.

6178 Statistics Manual, With Examples Taken From Ordnance Development. Edwin L. Crow, Frances A. Davis, and Margaret W. Maxfield. 288 p. 1955. U. S. Naval Ordnance Test Station, China Lake, Calif. (HA29 Un3.56s)

A manual to assist engineers and scientists in using statistical procedures to improve the efficiency of experiments.

6179 Report of Research and Technologic Work on Explosives, Explosions, and Flames, Fiscal Years 1953 and 1954. Ruth F. Brinkley and Robert W. Van Dolah. *U. S. Bureau of Mines, Information Circular* 7804, Nov. 1957, 127 p. (TN21 Un3i)

6180* (Russian.) Solving the Cauchy Problem for Hyperbolic Linear Systems. **K voprosu o reshenii zadachi Koshi dlia giperbolicheskikh lineinykh sistem.** B. A. Vostretsov. *Uspekhi Matematicheskikh Nauk*, v. 12, no. 5, Sept.-Oct. 1957, p. 197-204.

Derivation of the Cauchy problem with two independent variables.

6181 Vector Analysis. Louis Brand. 282 p. 1957. John Wiley & Sons, New York. (QA261 B73v)

The basic theory of vector algebra and calculus plus an introduction to their applications in statistics, dynamics, fluid mechanics, and electrodynamics.

See also: **5676** (silicosis and its control); **5921** (energy principle for hydromagnetic stability).